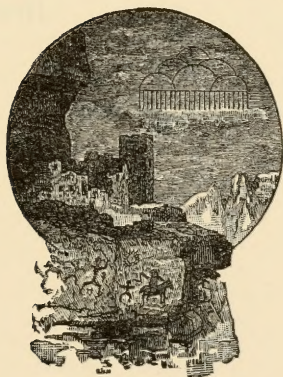


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AN ANALYSIS OF SOURCES OF INFORMATION ON THE POPULATION OF THE NAVAHO

By DENIS FOSTER JOHNSTON



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LETTER OF TRANSMITTAL

SMITHSONIAN INSTITUTION,
BUREAU OF AMERICAN ETHNOLOGY,
Washington, D.C., January 15, 1965.

SIR: I have the honor to transmit herewith a manuscript entitled "An Analysis of Sources of Information on the Population of the Navaho," by Denis Foster Johnston, and to recommend that it be published as a bulletin of the Bureau of American Ethnology.

Very respectfully yours,

HENRY B. COLLINS,
Acting Director.

Dr. S. DILLON RIPLEY,
Secretary, Smithsonian Institution.



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PREFACE

This study is dedicated to my wife and to the Dineh. The work was begun in 1955, as a doctoral dissertation in sociology at The American University. After its completion in 1961, it was expanded chiefly by the incorporation of the results of the 1960 census and the consequent revision of several sections of the text.

My greatest debt is to Frank Lorimer, who was exceedingly patient in trying to extract me from many of the pitfalls which await the unwary demographer. Many persons, both here in Washington and at the Navajo Agency, were most generous in offering advice and information. I am especially grateful to Robert W. Young, Francis Felsman, and the late J. Nixon Hadley, whose insight and assistance were invaluable.

I wish, finally, to express my thanks to Miss Susan Colby, for her painstaking and highly competent editorial efforts. Any errors which remain are, alas, the sole responsibility of the author.

D. F. J.

Washington, D.C.
January 1966

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AN ANALYSIS OF SOURCES OF INFORMATION ON THE POPULATION OF THE NAVAHO¹

By DENIS FOSTER JOHNSTON

INTRODUCTION

The Navaho² constitute the largest Indian tribe in the United States today, numbering over 80,000 persons or roughly one-fifth of the Indian population of the country. They occupy a reservation area of about 24,000 square miles, extending over northeastern Arizona, northwestern New Mexico, and parts of southern Utah (map 1). In addition, many Navahos are living on adjacent lands, particularly lands to the east and south of the reservation boundaries.

According to most indices of acculturation (such as measures of literacy, degree of social involvement with Whites, etc.) the Navaho have remained one of the least acculturated groups in the United States until the recent past.³ In their adherence to traditional folkways and modes of livelihood, they still manifest many of the values common to preliterate, preindustrial peoples in other parts of the world. One of the most significant manifestations of these traditional values is a high rate of fertility. The fertility of the Navaho, combined with reduced mortality, has caused them to experience a large increase in numbers during the past 90 years. Despite the extensive anthropological studies of the culture of the Navaho, the dynamics of their population growth has remained a matter of speculation or

¹ Submitted to the faculty of the Graduate School of The American University in partial fulfillment of the requirements for the degree of doctor of philosophy in sociology.

² In this study, the Anglicized spelling "Navaho" is used in preference to the Spanish spelling, "Navajo," except where reference is made to titles of organizations, geographic names, etc. which specifically use the Spanish spelling. Many authorities (including Kluckhohn, Spencer, Reichard, and the Bureau of American Ethnology) have sought to standardize the Anglicized spelling, while others (such as Underhill, Young, and the officials of the Window Rock administrative offices) appear to prefer the Spanish spelling. The earliest authoritative source on this subject advocated usage of the Anglicized spelling as more easily pronounced, while acknowledging the Spanish spelling as "the older and more correct form" (Franciscan Fathers, 1910, p. 26).

³ Gilbert, 1953, tables v, vi, and vii, pp. 159 ff. In this study, the lack of acculturation of a number of Indian tribes was estimated by means of the following indices: Proportion of fullblooded Indians in the tribe; proportion of tribe unable to speak English; proportion unable to read and write English; and proportion of those of school age not enrolled in school. On the basis of these combined indices, the Navaho were found to be the least acculturated Indian tribe both in 1910 and in 1930, and to be the most "resistant" to acculturation in the intervening period. The reader should note that the first of these indices reflects amalgamation rather than acculturation.



MAP 1.—The Navajo Reservation in relation to surrounding States. (After Underhill, 1956, p. 148.)

crude approximation. Thus, the Navaho may be said to typify the populations of the underdeveloped regions of the world, both in their persistently high fertility and in the limited nature of the information pertaining thereto.

THE RESEARCH PROBLEM

The present study is a comparative investigation of two major sources of information on the population of the Navaho: notably, the records of the Bureau of Indian Affairs and the enumerations of the Bureau of the Census. In this analysis, selected demographic data on the Navaho from a number of additional sources are also considered for the light they throw upon the primary sources under investigation. The major purpose of this inquiry is to describe the pertinent records of these two major sources and the procedures whereby their data are obtained, so as to evaluate their reliability and indicate some of the limitations contained therein.

BASIC CONCEPTS

In undertaking an investigation of the demographic data pertaining to the population of the Navaho, it is necessary at the outset to elaborate upon the fundamental concepts of "Indian," "Indian tribe," and "Indian population" which underlie much of the later analysis. The ultimate source of many of the discrepancies in Indian population data and other statistics on Indians can be found in the ambiguities inherent in these basic terms.

To begin with, the concept "American Indian" is a racial one, having reference to persons who belong or are related to the original inhabitants of America and the West Indies. As such, the term is subject to all of the difficulties and qualifications which generally apply to racial categories. The fundamental difficulty with such terms lies in the multiplicity of criteria whereby a given individual may be included in a given racial group. The primary criterion for legitimate inclusion in any racial category is, of course, biological. According to this criterion, a person is an Indian if he is descended from Indian stock. The practical application of this criterion, however, is subject to basic difficulties. First, there is the question of what proportion of a person's ancestry must be of Indian stock for the person in question to be classified as an Indian. Secondly, there is the problem of ascertaining the ancestry of many individuals for whom precise genealogical information is lacking. Finally, there remains the fundamental objection that no measurable biological trait can be ascribed universally and exclusively to any single racial group, unless that group has been completely isolated from contact with other groups over a long period of time.

The problem of classifying individuals into given racial categories is further complicated by the introduction of what might be termed cultural considerations. Even if "race" must be defined without regard to cultural factors, the fact remains that such factors are frequently operative in the classification of individuals among different racial groups as carried out in practice. Moreover, cultural associations may be more significant in the interpretation of social phenomena than alleged (but frequently undetermined) biological characteristics. According to a cultural criterion, a person might be designated an Indian if he participates in an Indian culture or manifests typically "Indian" values or attitudes in his behavior, manners, dress, etc. However, the application of a cultural criterion of racial membership is also subject to serious practical difficulties. First, the nature and extent of the cultural participation necessary to warrant inclusion of an individual in the category "Indian" must be prescribed. Secondly, some objective measures of such cultural participation must be devised

for use in situations where individuals also participate to some extent in non-Indian culture. Finally, any set of criteria which considers biological and cultural factors both must recognize that these factors are likely to vary independently to a considerable extent.

The confusion that results from this duality of biological and cultural criteria is familiar to all students of race. In the case of the American Indian, the serious implications of this confusion are evident in the following quotation from the report of a congressional committee investigating the Bureau of Indian Affairs:

There has been no standardized definition of "Indian" suitable for all purposes. It is quite evident that several ideas are involved in this word. There is the idea of biological descent or "degree of blood" as a definite something which makes a person an Indian. This "something" would be generally based on personal appearance plus local records such as the reservation or tribal roll containing the name of the person and his degree of blood or those of his parents or other relatives. Further, there is the cultural element, illustrated in the ability to speak an Indian language or by the person's participating in the customs and culture of some recognized Indian group, such as Indian arts and crafts or taking an active part in the tribal ceremonies. Finally, there is the "legal Indian" who is owner or part owner of "restricted" property and a member of some tribal group holding such property.

. . . A standard definition of Indian, applicable to all cases of Federal relationships with Indians, would require a special act of Congress. [Gilbert, 1953, p. 138.]

It is clear from the quotation above that the fundamental problem of determining who is an "Indian" in our society permits of no easy solution. With the biological and cultural admixture that has occurred among Indians, Whites, and Negroes, especially in the eastern part of the country, the existent statistics on the "Indian" population are of dubious validity, however accurate their actual compilation may have been. Even where the biological admixture is minimal, as in the case of the Hopi and Navaho Indians, their increasing participation in the general culture raises some questions as to the validity of the current statistics pertaining to these groups.⁴

With respect to the concept "Indian tribe," similar difficulties in definition are evident. In their attempt to establish an "operational" definition of the concept "tribe," Kelly and Hackenberg (n.d.) list four conventional criteria of "tribalness": a common language; a common territory; some degree of social solidarity; and some degree of political autonomy. The difficulties which arise in seeking to give these conventional criteria "operational" significance can be well illustrated by reference to the Navaho. With respect to the first criterion, the Navaho do speak a common language similar to that of the Apache, and belonging to the Athapascan family of languages which

⁴ This problem is aptly summarized by Frank Lorimer (1942, p. 13).

also includes languages spoken by Indians in Alaska and the Canadian Northwest, and in scattered localities along the Pacific coast.⁵

With respect to the second criterion, it is generally agreed that the Navaho have resided in the same general region of the Southwest for at least four centuries, and are known to have occupied a definite territory for most of that period.⁶

The third criterion of "tribalness," however, can be attributed to the Navaho only with extreme caution. Specific references to the Navaho date back over two centuries, and one study has traced the origin of the tribe as a distinct social organization to about A.D. 1485 (Hodge, 1895, p. 225; Hall, 1944, p. 100). However, it is doubtful that the Navaho were organized into a distinct group until after their arrival in the Southwest, in view of their evident relation to the Apache groups. In addition, physiological studies of the Navaho reveal an admixture of Ute, Shoshonean, Yuman, and other Indian stocks, suggesting that the Navaho tribe was largely composed of accessions from these groups.⁷ Such an admixture would at least suggest a very limited degree of social solidarity among these elements.

The criterion of "political autonomy," finally, must also be applied to the Navaho with caution. It is true that the Navaho retained their independence throughout the nearly three centuries of Spanish hegemony in the Southwest.⁸ However, the Navaho never achieved a centralized political organization of any kind. The largest economic unit they developed is the grazing community, of which there are hundreds, and the largest social unit they developed is the clan, of which some 77 have been distinguished (Hadley, MS. b). As Willard W. Hill (1940 b, p. 14) points out:

Speaking in strictly a political sense, a Navajo tribe does not exist. . . . The Navajo have never functioned as a unit in a concerted action . . . or been brought, even temporarily, under the leadership of a single person or individual group for a common purpose.

It should be evident from the considerations above that any statistics pertaining to Navaho "Indians" or to the Navaho "tribe" must

⁵ Underhill, 1956, pp. 4-5. An earlier work by the same author includes a plate showing the distribution of Athapascan languages in North America (Underhill, 1953, p. 273). The linguistic affinity of the Athapascan peoples is given more detailed treatment in Morice, 1907, and in Sapir, 1936.

⁶ The first region occupied by the Navaho in the Southwest is near the headwaters of the Rio Grande, north of the Jemez Plateau in northern New Mexico. From this region, the Navaho appear to have expanded gradually to the south and west into the much larger area they now occupy. The region of their original occupation is shown in Underhill, 1953, p. 40. For a good summary of the general question of Navaho origins, see Underhill, 1956, ch. 2.

⁷ Hodge, 1895, pp. 238-239. The original and still authoritative sources on the physiological characteristics of the Navaho are Hrdlička, 1900 and 1908.

⁸ In commenting on the Navaho at the start of the 19th century, Zebulon Pike mentions (1811, p. 337) the fact that they were frequently at war with the Spaniards at this time.

be interpreted in the light of the particular definitions of these terms which are utilized in a given case. The following discussion is an elaboration of the several Navaho populations which can be derived from different definitions of "Indian" and "tribe."

In theory, the biological criterion of race permits a wide range of population estimates, depending of course on the minimum proportion of Indian blood which is presumed necessary for inclusion of an individual in an Indian category. In actual practice, some persons have been included in allotments of Indian lands who had as little as one two-hundred-fifty-sixth part of Indian blood. Although the common practice at present is to exclude persons with less than one-fourth of Indian blood, the rolls of many Indian tribes include individuals who are less than one-fourth Indian.⁹ In the case of the Navaho, however, this problem poses no serious difficulty, in view of the overwhelming preponderance of "fullblooded" Indians among them. The basic operational difficulty with this criterion has already been stated; i.e., the impossibility of determining the proportion of "Indian" blood in a given individual in the absence of precise genealogical information.

The use of any cultural criterion for defining an Indian population is confronted with overwhelming problems. Any measurable indicator of cultural participation is likely to be somewhat superficial. Furthermore, there is the problem of weighing a person's participation in Indian culture against his participation in non-Indian culture. Nevertheless, some estimation of the population of "cultural" Indians would be most useful, both to anthropologists and administrators. The proportion of the Indians of a given tribe contained in the "core" of cultural Indians would constitute a good measure of the degree of acculturation experienced by that tribe.

In theory, the use of a biological criterion should result in a maximum population figure, while the use of a cultural criterion, if defined so as to imply preponderant participation in Indian culture, should result in a minimum population figure. Obviously, statistics based on the former definition cannot be compared to those based upon the latter definition, without important qualifications.¹⁰

The use of the several criteria of "tribalness" would result in a similar range of population estimates. The first criterion listed is that of a common language. In the case of the Navaho, use of this

⁹ Gilbert, 1953, p. 138. One instance of the inclusion on an Indian Tribal Roll of an individual whose degree of Indian blood was listed as 1/256 occurred among the Wyandotte tribe of Oklahoma. See the Federal Register, vol. 22, No. 66, April 5, 1957, p. 2286.

¹⁰ The biological criterion would produce a maximum population figure only if both patrilineal and matrilineal Indian descent were recognized. Among the Navaho, descent is traced matrilineally; strict adherence to this criterion would produce a somewhat smaller population figure.

criterion would tend to result in a maximum population figure, similar to that obtained with the biological criterion. The criterion of language has the added advantage that it is still characteristic of nearly all Navaho, and of very few non-Navaho, at the present time. The basic difficulty with this criterion in population studies is the problem of ascertaining this characteristic during actual enumerations of a population. The mere inclusion of a question on language in the census schedules would not be adequate, especially in an area such as the Southwest, where some persons might seek to be listed as Indians for the possible benefits implied in this status.¹¹ Provisions for a language test, on the other hand, would greatly increase the cost of any enumeration.

The second criterion of tribalness, that of common territory, can no longer be applied in studies of most American Indian populations, because many Indians either no longer possess reservation lands or have established residence away from their reservations. In the case of the Navaho, the "de facto" reservation population as enumerated, say, on April 1 of a given census year may amount to no more than 80 percent of the "de jure" Navaho population. In addition to their extensive participation in migratory agricultural work during the late spring and summer months throughout the Western States, many Navahos are in permanent residence beyond the boundaries of the reservation-proper. Despite the relative isolation of the Navaho, the population in residence on the reservation at any given time can no longer be taken as representative of Navahos as a whole. A few summary figures may clarify this point. In 1950, about 55,000 Navahos were enumerated within the confines of the Navajo Reservation. Navajo Agency officials further estimated that about 7,170 Navahos were residing in the "service area" immediately surrounding the Navajo Reservation and that an additional 7,000 Navahos were residing in more scattered localities throughout the United States. This yielded an estimated total Navaho population in April 1950 of 69,167. In 1960, an estimated 60,000 Navahos were enumerated within the confines of the Navajo Reservation during the census taken in April of that year. However, the total number of Navaho at this time is largely conjectural. If we accept the Bureau of Indian Affairs' estimate of 69,167 Navahos in April 1950 and their recent estimate of 93,377 Navahos in December 1961, the total number of Navaho at the time of the 1960 census would have been 89,451. This estimate implies that the off-reservation Navaho population increased from just over 14,000 in 1950 to over 29,000 in 1960. Thus, the reservation

¹¹ In the 1950 census, an attempt was made to obtain statistics on the ability to use the English language among residents of the major Indian reservations. These findings were not published until 1956. Literacy data obtained for the Navaho are presented in table 8, p. 50.

Navahos, who represented four out of every five Navahos in 1950, represented only about two out of every three Navahos in 1960.¹²

The third criterion, that of social solidarity, is particularly difficult to utilize in a determination of Indian population. Reference has already been made to the limited nature of such feelings of solidarity among the Navaho, at least until recent times. In fact, some authorities consider the social solidarity which is now found among various Indian tribes to be an artificial development brought about by the exigencies of reservation life, rather than an integral expression of tribal culture (Hill, 1940 b; Kelly and Hackenberg, n.d., p. 9). Furthermore, even if it is conceded that with improvements in communications and the organization of tribal governments, such solidarity is today important, the problem remains of applying this criterion in determining population. The closest indicator of social solidarity that has ever appeared on a census schedule is a question on tribal affiliation, and even that question was not included in the general decennial enumerations after 1930. If an actual measure of social solidarity could be devised, the resultant population would correspond closely to that obtained from using any cultural criterion. Such a measure might thus be used in estimating the "residual" Indian population whose primary identifications remain with the traditional Indian culture.

The final criterion of tribalness, that of political autonomy, has little value in estimations of Indian population, since that autonomy is largely a legal fiction at the present time. Whatever rights an Indian may enjoy in his capacity as a "ward" of the State or as a member of some Indian tribe, he is subject to the basic laws of the land. Such "autonomy" as remains consists largely in the right to share or use properties held by the tribe, and in the other rights and duties entailed by tribal membership. As a criterion for determining Indian population, therefore, political autonomy reduces to a question of inclusion on a tribal roll or similar register. The criterion for such inclusion, in turn, is genealogical, although the minimum quantum of "Indian blood" necessary for inclusion varies considerably from tribe to tribe. In addition, the patent impossibility of ascertaining such a "quantum" with precision introduces still further variation in the application of this criterion. In the case of the Navaho, there is a further difficulty—inclusion on the register maintained at the

¹² The data for 1950 are summarized in Bureau of Indian Affairs, 1954 a, p. 18. The 1960 reservation population is an estimate prepared by the Division of Indian Health, U.S. Public Health Service, from unpublished tabulations of the non-White population by enumeration district, as obtained in the 1960 decennial census. The total Navaho population as estimated in December 1961 is given in Young, 1961, p. 331. The estimated total Navaho population in 1960 was obtained by interpolation.

Navaho census office at Window Rock does not legally constitute membership in the Navaho tribe at the present time.¹³

In summarizing the above discussion, it should be noted that a number of population figures can be obtained for the Navaho as for other Indian tribes, depending upon the criteria used in defining the categories "Indian" and "Indian tribe." Using a biological criterion (such as having one-fourth or more "Navaho" blood) or a linguistic criterion (i.e., the ability to speak Navaho) would produce a maximum population figure. On the other hand, using some index of primary dependence upon traditional Navaho culture (such as inability to speak English) would produce a minimal population figure. Using such criteria as being listed on a tribal roll or similar register, or having residence on or near the reservation would, finally, result in population estimates falling somewhere between these two extremes.

In view of the multiplicity of populations obtainable from conventional definitions of the categories "Indian" and "Indian tribe," it is necessary to consider an alternative approach to the problem of determining Indian population. This alternative involves prescribing the several "ideal" Indian populations whose estimation would be useful for specific purposes.

A COMPARISON BETWEEN THEORETICAL AND OBSERVED NAVAHO POPULATIONS

The most inclusive Navaho population about whom information might be desired is the population of all persons who meet the minimum eligibility requirements for inclusion as members of the Navaho tribe. In theory, this population would constitute a *de jure* Indian population comprising all persons who are subject to the special rights and status accorded Indians in our society. Estimates of this number, both for Navaho and for Indians in general, would provide a basis for determining needs and allocating goods and services. This inclusive population can thus be termed the *de jure* Navaho population, since it includes, in theory, all persons who are legally entitled to administrative consideration as Navahos. The fundamental criterion whereby this population can be determined is biological, because membership in any Indian tribe is ultimately determined by one's Indian parentage. Unfortunately, as has been stated, the minimum quantum of "Indian" blood necessary for inclusion of an individual as an Indian varies from tribe to tribe and from time to time within a tribe. In the case of the Navaho no such biological requirements have yet been set forth officially, although the common requirement of being at least one-fourth Indian for inclusion on the

¹³ From discussion with Wilbur Morgan, supervisor of the census office, and H. B. Colliflower, chief of the Operations Division of the Navajo Agency at Window Rock, Ariz., summer 1957.

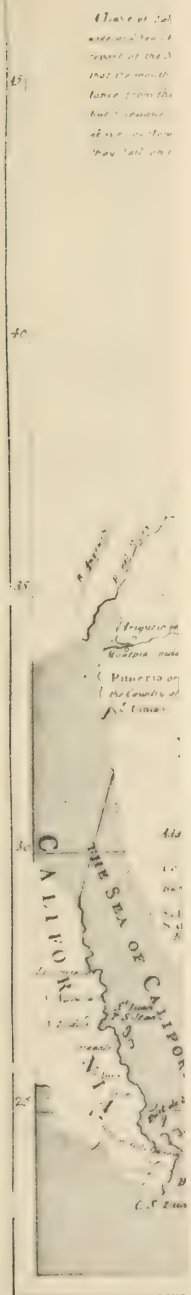
Navajo Agency census office roll is in practice at present.¹⁴ Although the overwhelming majority of Navahos are still "fullblooded" Indians, the absence of specific official requirements for inclusion on the Navaho rolls poses serious problems for any future improvement of Navaho population statistics. Furthermore, even if such criteria were specified, the development of operationally useful and verifiable indicators of "degree of Indian blood" would pose additional difficulties.

Before this theoretical population of *de jure* Navahos can be estimated, it is necessary to give it some kind of operational definition. That is, some procedure must be specified whereby individuals can be classified as Navaho or non-Navaho according to the stated criterion. Assuming that this criterion is possession of at least one-fourth of Navaho blood, the following problems must be overcome. First, an individual must be able to refer to some record of his ancestry which indicates the tribal affiliation of his parents and grandparents, as well as their admixture with other ethnic groups, if any. Even where the large majority of the tribal members are fullblooded, a significant minority remains whose blood quantum is unknown or not reported. Thus, in 1950, over 11 percent of the resident Navaho population was listed as of unknown blood quantum (including non-responses). In New Mexico alone, where the degree of admixture with various Pueblo peoples and others is presumably somewhat higher, the proportion of Navahos whose blood quantum is either unknown or not reported rose to nearly 17 percent in 1950.¹⁵ It is obvious that the inclusion or exclusion of the majority of these unknowns would greatly affect the resultant population figures. Furthermore, it is likely that the genealogy of many of these individuals cannot be determined from existing records.

A second problem in estimating this *de jure* Navaho population arises from the necessity of including all persons with the requisite Navaho ancestry, regardless of their current place of residence. In 1950, about 20 percent of the total Navaho population was estimated by officials of the Navajo Agency to be in temporary or permanent residence off the reservation. Although this may have been an overestimate, it is generally agreed that the proportion of off-reservation Navahos has been increasing fairly rapidly in recent years. Significant groups of Navahos are now established in a number of American cities such as Los Angeles and Chicago. As individual Navahos come to share in the general mobility of the American people, they will

¹⁴ Each tribe is empowered to establish its own rules of eligibility for enrollment of individuals as tribal members. The fact that these rules are not uniform makes it impossible for the Bureau of Indian Affairs to utilize a general definition of "Indian" in its own records. On this general problem, see Gilbert, 1953, and Hadley, 1952 b.

¹⁵ Bureau of Indian Affairs, 1954 a, p. 26. Of the 48,799 Navahos whose blood quantum was reported, only 626 were listed as "less than fullblooded," giving a percentage of fullbloods of 98.7.





MAP 2.—John Senex's map of 1710, showing the territory of the "Apaches of navaio," and containing Taos and other now New Mexican pueblos and the Moquis pueblos.

undoubtedly distribute themselves ever more widely. Furthermore, insofar as these Navahos experience the assimilation processes common to other ethnic minorities, they may lose many of the characteristics which enable them to be readily identified either as Indians in general or as Navahos in particular.

Finally, the *de jure* population must exclude all persons who do not meet the minimum eligibility requirements, even if they are on record as having received services accorded Navahos in the past. The relative isolation of the Navaho until recent years makes it unlikely that significant numbers of non-Navahos have, in fact, appeared on the several administrative records of the Navajo Agency. However, the anticipated advantages of such inclusion may become an important factor to consider in the near future, since many individuals may seek to establish themselves as Navahos in order to share in the benefits accruing from such a status.¹⁶

The second theoretical Navaho population whose estimation would be useful can be defined operationally as the number of persons who are actually making use of specified rights or services available to them in their capacity as Navahos at any given time. Such a population can be approximated by referring to the appropriate administrative records, so that it can be designated, in general, as the "administrative" Navaho population. The records of the several administrative offices of the Navajo Agency contain information on a number of such populations, such as the population of Navahos registered with the Arizona State Employment Service, or those applying for grazing permits, etc. In theory, it would be possible to compile a "master register" of persons carried on any of these several administrative records, and thus arrive at an estimate of the total administrative Navaho population. In practice, however, such a compilation would involve an enormous expenditure of clerical effort in order to match individuals appearing on more than one record so as to avoid duplication. Furthermore, the vagaries of Navaho nomenclature might well defeat any attempt to develop a reliable technique for matching names appearing on one record with those appearing on another.

The third theoretical population whose estimation would be useful is difficult to define. It can be termed the population of "cultural" Navahos; i.e., those persons whose primary identification remains with the traditional ways of life of Navaho culture. One possible operational criterion for estimating this population would be the

¹⁶ Beale (1954, p. 2) points out that there are over 2 million people of Mexican ancestry in the Southwestern United States, many of whom are of partial Indian descent.

In the last special enumeration of the Indian population in 1930, the enumerators in Arizona, New Mexico, and California were cautioned about the problem of differentiating between Mexican laborers and Indians, since "some Mexican laborers may endeavor to pass themselves as Indians" (Bureau of the Census, 1937, p. 1).

inability to speak English. Other possible criteria might be participation in exclusively traditional activities, or primary dependence upon traditional means of livelihood. As in the case of the "administrative" population, several "cultural" populations might be distinguished, reflecting different degrees of involvement with traditional Navaho culture. Estimates of this population would be useful in providing some measure of the progress of acculturation among the Navaho as a whole.

To summarize, it is possible to distinguish three "theoretical" populations whose estimation would be useful for scientific or administrative purposes. The largest of these is the *de jure* population, comprising all persons who are legally classifiable as Navaho. The second is the "administrative" population, comprising all persons who are on record as utilizing specified Navaho administrative services or otherwise participating in Navaho affairs as Navahos. Finally, there is the "core" population of "cultural" Navahos, comprising those persons who still manifest a primary involvement with traditional Navaho culture.

The remaining problem to be considered in this chapter is the correspondence between these three theoretical populations and the three observed populations represented in the data obtained by the Bureau of the Census and the Bureau of Indian Affairs.¹⁷

The Indian population which is enumerated in the decennial censuses conducted by the Bureau of the Census can best be described by quoting the Bureau's own definition of the category "American Indian":¹⁸

American Indian.—In addition to fullblooded American Indians, persons of mixed white and Indian blood are included in this category if they are enrolled on an Indian tribal or agency roll or if they are regarded as Indians in their community. A common requirement for such enrollment at present is that the proportion of Indian blood should be at least one-fourth.

The first point to be noted is that this definition combines the biological and the cultural criteria of race. The basic criterion is presumably biological (or, more precisely, genealogical), but "doubtful" cases are referred to the judgment of the enumerator or to the attitude prevailing in a given community. Secondly, it should be observed that population figures for specific tribes can only be approximated from the data of the Bureau, since no question on tribal affiliation is ordinarily included on the regular census sched-

¹⁷ The data from these and other sources are analyzed and compared on pp. 66-127.

¹⁸ Bureau of the Census, 1963 c, p. x. In censuses prior to 1960, the above definition was supplemented by the following important qualification: "The information on race is ordinarily not based on a reply to questions asked by the enumerator but rather is obtained by observation." See, for example, Bureau of the Census, 1953 a, p. 4.

ules.¹⁹ Thirdly, the above definition has been found to be inadequate in the off-reservation areas, where the problem of identifying Indians as such is most difficult and the judgment of the enumerator and/or of the community is most likely to be in error.

The latter limitation appears to have been overcome by means of an important procedural innovation introduced for the first time in the 1960 decennial census. Just prior to April 1, 1960, the Post Office Department distributed a brief questionnaire called an Advance Census Report to all occupied housing units throughout the country. The population items included in this questionnaire covered name, relationship to head of household, age, sex, color or race, and marital status. In consequence of this procedure, respondents were given an opportunity to classify themselves as to race, prior to the enumerator's visit. When and if the respondent received and filled out this form, he merely gave it to the enumerator, who was then instructed to transcribe the information from the Advance Census Report onto a FOSDIC schedule which was designed for use with electronic data-processing equipment (Bureau of the Census, 1963 c, p. 61).²⁰

The enumeration of Indians, especially in off-reservation areas, appears to have been substantially improved by this procedure. However, it is unlikely that the count of Indians on or near reservations was materially affected. Among the Navaho in particular, where conventional "addresses" are unknown and the local trading post remains the major point of contact with the outside world, self-enumeration procedures would appear to be highly impracticable.²¹

Finally, it should be noted that the enumeration procedures employed by the Bureau of the Census cannot be expected to produce

¹⁹ Bureau of the Census, 1963 a, p. vi. Extensive information on Indians according to their tribal affiliation was obtained only in the special enumerations of Indians conducted by the Bureau in 1890, 1910, and 1930. The data published for specific Indian agencies from the enumerations of 1940 and 1950 are obtained from estimates of the population of specific tribes. These estimates are based on the proportional distribution of Indians from different tribes residing in the various counties reporting an Indian population in 1930. These estimates also depend upon the figures of the Bureau of Indian Affairs, giving the numbers of Indians enrolled in each tribe according to their county of residence.

²⁰ The basic procedure was quite straightforward. The enumerator recorded the information for each respondent onto the census schedule by filling in the appropriate blank circles with an ordinary lead pencil. All of the basic census items (i.e., those asked of the entire population) were recorded in this manner. Where the item in question could not be coded by the enumerator (as, for example, country of birth), he wrote the appropriate responses on the schedule. These were then coded by hand at the central processing facility in Jeffersonville, Ind. After all items had been coded on the original schedules (when all the information had been expressed by means of different combinations of filled circles), the schedules were microfilmed. The microfilm was then shipped to Washington for processing through a "FOSDIC" machine (Film Optical Sensing Device for Input to Computers). By means of this instrument, the darkened circles appearing on the microfilm were transcribed onto magnetic tape which could then be run through the computers for tabulation.

²¹ I was privileged to serve briefly as a "participant-observer" of the 1960 enumeration on the Navajo Reservation. I found no sign of the Advance Census Report in the localities visited, and the several enumerators I accompanied did not attempt to collect such forms.

results of equal reliability under all conditions of enumeration. Although these procedures are developed with sufficient flexibility to meet a wide range of environmental circumstances, the peculiar pattern of population settlement on the Navajo Reservation area, combined with a severely limited road network and important cultural differences, undoubtedly limits the effectiveness of any enumeration process.

In the first place, the area to be covered is about 24,000 square miles (roughly the size of the State of West Virginia). The population of this area is widely scattered, with an average density of only about three persons per square mile. Within this area, the enumerators are confronted with a peculiarly Navaho pattern of land settlement. Although there are several regions of relatively high population density within the reservation area, the familiar patterns of town or village settlement are almost entirely lacking. Individual dwellings or hogans, or small clusters of hogans, appear to be located with little reference to the major road network. In order to locate these small groups, it is necessary to investigate a bewildering maze of wagon tracks, many of which lead nowhere or terminate at the site of long-deserted hogans or temporary encampments.

A further limitation to be recognized is related to the migratory habits of the Navaho residents. As one experienced official has pointed out, by the time the roads are sufficiently passable to permit an enumerator to approach the more isolated hogans, their residents are very likely moving to a different location. In fact, many Navahos do abandon their relatively permanent winter hogans late in March, just before the date of the decennial enumeration.

Finally, some mention must be made of the peculiar problems introduced by common practices of individual nomenclature among the Navaho. A name given to an enumerator may or may not be the name by which a given individual is known locally. Furthermore, it may or may not correspond to the name used either by his parents or his older children. Careful studies of individual families in the Ramah community, for example, have revealed instances of individual Navahos being listed under several names on as many administrative records. Under these circumstances, the problems of verification and of avoiding duplication approach insuperability.

The second major source of information on Indian population is the Bureau of Indian Affairs. Whereas the figures of the Bureau of the Census are derived from decennial enumerations, those of the former are derived from what amounts, in theory, to a continuous registration system. Each Indian agency maintains a tribal roll or register of the Indian population under its jurisdiction. The Bureau of Indian Affairs' estimate of the total Indian population for a given year is obtained by summing the figures reported by the several

Indian agencies for that year, together with further estimates of the Indian population residing outside the several jurisdictions.

In the case of the Navajo Agency, population estimates are commonly derived from the "census office roll" which is maintained at the headquarters of the Navajo Agency at Window Rock, Ariz.²² The basic roll in current use was compiled by means of a special enumeration conducted by agency officials in 1928-29. At the time, separate rolls were prepared by each subagency. Since 1929, individual Navahos have been registered on this roll by means of two main procedures. First, if the birth of an infant is registered at any hospital or other facility on or off the reservation, and its parents are identified as Navahos, a copy of the birth certificate is sent to the Navajo Agency at Window Rock, where it is duly recorded on its roll.²³ Secondly, individual Navahos can voluntarily register themselves at the census office and establish the necessary identification.²⁴ Considerable effort has been expended in recent years to inform all Navahoes of the importance of this register, but it remains an open question as to how many of the more isolated Navaho families have not yet appeared thereon, despite the publicity and the special enumerations that have been carried out in the past to bring existing rolls up to date.²⁵

As presently constituted, therefore, the Navajo Agency census office roll is a listing of all persons who have ever been recorded as Navahos since the roll was established in 1928-29, either through their certification of birth, voluntary registration at the census office, or through periodic limited surveys conducted on the reservation since 1929, minus persons whose deaths have been reported since their original enrollment.

The population data obtained from this roll are subject to five major limitations: First, the registration of births and deaths, while substantially improved in recent years, is by no means complete. Second, some of the most isolated or least "acculturated" Navahos may still be

²² References to the Navajo Agency "census office" roll should not be confused with references to the decennial censuses conducted by the Bureau of the Census. The former is the designation given to the roll maintained by officials of the Navajo Agency and tribe at Window Rock, Ariz.

²³ The same procedure obtains in the case of the death of a Navaho.

²⁴ Increasing numbers of Navahos are recognizing the importance of having themselves and their children duly registered at the census office. During the summer months of 1957, I observed a continuous and heavy traffic of Navaho families through the census office at Window Rock, most of whom were apparently registering themselves or their children for the first time.

²⁵ The present Navajo Agency census office roll was originally prepared in 1939 on the basis of existing subagency rolls. These subagency rolls had been established originally at the headquarters of the several Navajo Jurisdictions in 1928-29. At the time, extensive enumerations were carried out for the purpose of setting up these rolls. Supplementary censuses were conducted in 1933, 1936, and 1939, bringing the rolls up to date each time. Since 1939, no supplementary enumeration has been attempted. However, the roll has been greatly improved in recent years through the efforts of the agency staff and the general improvements in birth and death registration on the reservation. (From discussion with Wilbur Morgan of the census office and the late J. Nixon Hadley, of the Department of Health, Education and Welfare.)

omitted from the roll, since none of the registration procedures outlined above can be guaranteed to reach everyone. Third, the possibilities of duplicate registration, mistaken identity, or registration with the wrong family or in the wrong jurisdiction, remain serious, especially in a cultural situation where many individuals choose an "official" English name for purposes of registration, without reference to either their parents' tribal names or to the name or names whereby they are themselves known in their own localities. A further complication arises in this connection from the fact that the census office roll is maintained on a patrnomial system while the Navaho traditionally identify themselves matrnomially.²⁶ Fourth, any effort to maintain a single authoritative listing of all Navahos is greatly complicated by the proliferation of administrative records that has occurred since the basic roll was established in 1928-29. Although many of these records are adequate for the purposes they are intended to serve, few of them cover the entire population, while most of them refer to overlapping segments of the population. Thus the task of reconciling the several records so as to maintain a single all-inclusive register of the population has become increasingly difficult. Finally, mention must be made of the heightened mobility of the Navaho in recent years. No registration system yet devised can hope to maintain accurate and up-to-date records of the location of individual families or "outfits" of Navahos under present conditions, when many Navahos are finding temporary or permanent employment in a dozen States. Furthermore, the intensive construction taking place in certain areas of the reservation is having a profound effect upon patterns of settlement within the reservation itself, so that population distributions recorded in the late 1930's are no longer representative.

On the basis of the data recorded by the Bureau of the Census and the Navajo Agency "census office" at Window Rock, it is possible to distinguish three "observed" Navaho populations.

First, the enumerations of the Bureau of the Census provide a figure for the total Navaho population residing in the Navajo Agency area at the time of the enumeration. This area comprises the reservation-proper, together with a wide belt of territory mostly to the east and south of the reservation known to be occupied primarily by Navahos, plus a few scattered Navaho communities which are separately identified in the census enumerations.

²⁶ In examining these rolls, I have observed the frequent presence of several English surnames, in addition to the parents' Navaho names, within the same family. For example, one son may be listed as "John Jones," another as "Jim Brown," while the father's surname is "Yazzie" or "Begay." The practice of adopting common English surnames, which is apparently fairly widespread among the younger generation, obviously complicates the task of identifying new additions to the roll with the proper families. The problem of nomenclature, combined with the failure of the rolls to recognize the Navaho system of matrilineal descent, has made it extremely difficult, if not impossible, to maintain these rolls.

Second, the enumerations of the Bureau provide a separate figure for the population of Navahos residing within the confines of the reservation itself, since the boundaries of the census enumeration districts are drawn so as to coincide approximately with the reservation boundaries.

Third, the Navajo Agency census office provides a figure for the total population of Navahos that are registered on its rolls.²⁷

If each of these three observed populations were recorded with complete accuracy and coverage, we would expect to find the following correspondence between "observed" and "theoretical" populations: The enrolled population would correspond to the *de jure* Navaho population, comprising all persons who are legally classifiable as Navahos, regardless of their place of residence; the population of Navaho enumerated in the Navajo Agency area would correspond to the "administrative" Navaho population, comprising those Navahos who reside sufficiently near the reservation to be able to avail themselves of its administrative services; and the population of Navahos enumerated in the Navaho service area, including residents of the reservation-proper, would correspond roughly to the core population of "cultural" Navahos, comprising those persons who retain a primary identification with the traditional Navaho way of life.

The following data, obtained from the results of the 1950 and 1960 decennial censuses of population and from estimates prepared by officials of the Navajo Agency, provide rough estimates of the size of the Navaho populations which might be classified under each of the three theoretical population categories described above.

First, the total enrolled Navaho population, corresponding in theory to the *de jure* total, was estimated by Navajo Agency officials at 69,167 in April 1950 and at 93,377 in December 1961. This implies an average annual rate of natural increase of 2.57 percent during this period.²⁸

Second, a total of 64,274 Navahos were enumerated in the 1950 census as residing in an area defined as the Navajo Agency area. At this time, Navajo Agency officials estimated that 62,167 Navahos were residing in the Navaho service area. Either figure could be taken as an estimate of the total population of "administrative" Navahos in 1950.²⁹

²⁷ The tribal rolls commonly distinguish between persons residing "in the jurisdiction where enrolled" and persons residing "elsewhere" or "in another jurisdiction." However, in the case of the Navaho, this classification becomes increasingly unreliable with the passage of time, since much of the movement that occurs, both between jurisdictions on the reservation and off the reservation, is not recorded by the authorities.

The general problem of establishing a population register for Indians in the Southwest is treated in Kelly and Hackenberg, 1957.

²⁸ See footnote 12, p. 8, for the source of these estimates.

²⁹ The census figure is published in Bureau of the Census, 1953 a, p. 62. No corresponding figure can be given from the published results of the 1960 census, since the published data pertain to all Indians enumerated in Apache, Navajo, and Coconino Counties of Arizona, San Juan County of Utah, and McKinley and San Juan Counties of New Mexico. These figures therefore include, in addition to Navahos, several thousand non-Navahos, mostly Hopis, Zunis, and Apaches. See Bureau of the Census, 1963 c, table 51, p. 210.

Third, a total of 54,997 Navahos were enumerated in the 1950 census as residing within the confines of the Navajo Reservation itself. The corresponding population was 60,016 in 1960, implying an average annual rate of increase of only 0.87 percent during this period. These figures might correspond to the total population of "cultural" Navahos.³⁰

The association of the above population totals with the three theoretical population categories is, of course, somewhat arbitrary. However, this association does permit a rough approximation of the relative growth of these three populations since 1950. In 1950, the core population of cultural Navahos (those residing within the boundaries of the reservation) amounted to 80 percent of the *de jure* total. Taking the service area population as a minimum estimate of the administrative population at this time, the latter amounted to a total of 90 percent of the *de jure* total. Although the 1960 data do not yield a satisfactory estimate of the administrative population as distinct from the total *de jure* estimate, they do indicate that the proportion of *de jure* Navahos residing outside the reservation-proper has risen from about 20 percent in 1950 to 33 percent in 1960.³¹

TRIBAL ECOLOGY AND CULTURE

A BRIEF HISTORY OF THE NAVAHO

The origins of the Navaho, like those of most preliterate peoples, can only be described in very general terms. They, like the Apache, are an Athapascan people, which implies that their ancestors must have migrated into their present locale from the forest regions of Alaska and western Canada. The scattered pockets of Athapascan-speaking peoples remaining along the Pacific coast are evidence of this migration, while other evidence (mainly ruins of Navaho-type hogans along the eastern slopes of the Rockies) suggests parallel southward movements of Athapascan peoples farther to the east (Huscher and Huscher, 1942).³²

The period during which these migrations to the southwest took place has not been precisely determined. Archeological findings suggest the appearance of Athapascans among the Colorado Rockies as early as A.D. 1100, but the earliest date for a southwestern site which is conclusively Navaho in construction has been established at A.D. 1550 (Wormington, 1956, pp. 105 f.). In his study of Navaho and Apache origins, Hodge (1895, pp. 225, 238 f.) attempted to compare

³⁰ See footnote 12, p. 8 for the source of the 1950 and 1960 estimates.

³¹ An excellent summary of the limitations of the procedures and results of the earlier demographic research conducted by both the Bureau of the Census and the agency officials of the Bureau of Indian Affairs is given in Bureau of Indian Affairs, 1935, pp. 62 ff.

³² In this connection, Underhill, 1956, pp. 11 f., mentions a reverence for the buffalo in a number of Navaho myths and rites as indicative of onetime residence in the Plains area on the part of Navaho ancestors.

the Navaho references to their origins in their own creation myth to available historical references. By this procedure, he placed the time of the "creation" of the Navaho tribe at about A.D. 1485, and established the date of the first significant accession to their population at about A.D. 1560. He concluded that the ancestors of the Navaho did not arrive in the Southwest until the latter part of the 15th century. Although some authorities (notably Bourke; Swanton and Dixon) have expressed disagreement with Hodge on this point, the view that the Navaho and Apache are relatively recent arrivals in the Southwest has gained general acceptance at the present time.³³

The time of the initial organization of the Navaho into a distinct tribe is also obscure. It is generally agreed that they were so organized before the 18th century, embodying elements from a number of Pueblo groups and other neighboring tribes (Hodge, 1895, p. 238). Furthermore, the fact that the Navaho occupied an extensive area in the Southwest as early as the latter part of the 17th century is attested to by an early reference to the "extensive province of the Navahos, [extending] 100 leagues from North to South . . . and 300 leagues from East to West"³⁴ (see map 1). However, there are few clues to their tribal organization at this time. The fact that the Navaho successfully retained their cultural independence throughout the three centuries of Spanish hegemony in the Southwest is probably attributable more to their geographic isolation than to the strength of their tribal organization. The Navaho did sustain intermittent raiding expeditions against their neighbors throughout this period, but such forays do not imply more than a local political organization at most (Hall, 1944, p. 100; Pike, 1811, p. 337). The ethnic diversity of the peoples making up the Navaho tribe is further evidence that they must have been loosely organized at this time. Spencer points out that their clan system, on which much of their social organization is based, did not develop until after the Navaho reached the Southwest. This suggests that they could not have developed any general social or political organization until fairly recently in their history (Spencer, 1947, p. 128; cf. Hill, 1940 b, p. 19).

The relationship of the Navaho to the Apache has been the subject of considerable controversy. Bandelier (1890-92, p. 175) considered the several Apache bands to be offshoots of a central body of Navahos, apparently reasoning that the greater numbers and contiguous territory occupied by the latter implied an earlier organization. In his dissertation on the early history of the Navaho, Worcester (MS., p. 27) expresses a contrary view, arguing that the Navaho are offshoots of

³³ Bourke, 1895; Swanton and Dixon, 1914. "Relatively recent arrivals in the Southwest" can be taken to mean sometime within the past 10 centuries. See Underhill, 1956, pp. 15 ff.; Kluckhohn and Leighton, 1951, pp. 3 f.

³⁴ In a letter by Gov. Francisco Cuervo y Valdes of Santa Fe, N. Mex., dated August 18, 1706. As quoted in Reed, 1941, pp. 485 ff.

a parent Apache group. He reasons that since the Navaho are composed of accessions from several diverse peoples, the original core of Athapascan-speaking Navahos must have been composed of a relatively small number of persons who broke off from one or more of the larger Apache groups. He also suggests that the complex ethnic admixture of present-day Navahos indicates that they must have resided in the Southwest for a considerable period.³⁵

The earliest reference to the "Navajo" in the written records is actually a reference to the Apache by Juan de Oñate in 1598. About 30 years later, Zarate-Salmeron referred specifically to Navaho as the "Apaches de Nabajú." At about this time, Fray Alonso de Benavides was in contact with Navahos, making the undoubtedly exaggerated report of a 2-day assemblage of over 30,000 Indians.³⁶

From these and similar references, it is clear that the Navaho did constitute some kind of tribal group throughout the period of Spanish control in the Southwest. The history of the Navaho during these three centuries can be summarized as a gradual transition from a culture with a simple hunting and gathering economy to a more stable and relatively complex culture based upon a combined herding and agricultural economy. With this shift in economic base came a gradual increase in population. This increase is attested to by the evident expansion of the Navaho from their original locale and by the increasing frequency and severity of their incursions into the territory of the Pueblo and other early inhabitants of the region. Worcester stresses the fact that the growth of Navaho population was begun well before the 18th century. The acquisition of sheep from the Spaniards and the adoption from the Pueblo peoples of improved agricultural techniques provided the Navaho with a growing and relatively stable food supply. Thus, as the Navaho were transformed from true nomadic hunters and gatherers into pastoral herders and agriculturalists, their numbers began to increase and they were able to extend their control over a larger territory (Worcester, MS.). Map 2 (facing p. 10) shows their approximate location at this time.

The major disturbance which is recorded during this long period is the revolt of the Pueblos in 1680, which resulted in the temporary exile of the Spanish rulers. The severe repressive measures imposed upon these Pueblo Indians by the Spanish upon their return some 12 years later had a profound effect upon the Navaho. By remaining on the sidelines throughout this period, the Navaho reaped a rich

³⁵ Worcester, MS., p. 11. The findings of Āles Hrdlička (1900, 1908), whose physiological measurements of Navahos indicated their composite makeup, are usually cited in this regard.

³⁶ Hodge, 1910, pp. 41 ff. Cf. Worcester, MS., p. 18. Oñate was by no means the first explorer to enter this region. Lopez de Cardenas passed through Acoma and Zuni in 1540, and Coronado appears to have ventured to the north of these pueblos in 1541. Coronado in particular must have approached the region of original Navaho habitation in the Southwest. See Palmer, 1957, p. 149.

harvest in stock, which they easily captured, and in refugees which they acquired from the Pueblo villages. The extensive intermingling which followed had an impact upon every aspect of Navaho culture. It brought new techniques in agriculture, weaving, and pottery-making, as well as important modifications in social organization, language, and even in Navaho myth and ritual (Underhill, 1956, p. 41; Spencer, 1947, p. 128). The Spanish rulers of the period were evidently hopeful that in borrowing so many traits from the Pueblo, the Navaho would eventually also adopt the settled agrarian way of life of the Pueblo. However, the Navaho never fully surrendered the cultural values of an earlier era. In their gradual expansion into the more arid regions to the south and west of their original territory, the Navaho adopted a more nomadic pastoral way of life, relegating their agricultural activities to a place of secondary importance. It is at this time that the horse became an item of much prestige among the Navaho, and the raiding forays made possible by their possession of horses became an important source of both material gain and social prestige among them. The Navaho were never as exclusively devoted to raiding and other warlike activities as their neighbors, the Ute, Comanche, and Apache, but they did acquire a lasting reputation for their repeated forays among the more settled Pueblo peoples as well as among the Whites who were beginning to arrive in this region in significant numbers. By the time the U.S. officials and settlers arrived to displace the Mexican authorities in 1846, the Navaho were adept at mounting raiding expeditions in order to supplement their herds and flocks and to capture occasional slaves.

It is interesting to note that neither the Spanish nor the American authorities appreciated the true significance of the raiding practices of the American Indians. These raids were generally interpreted as the deliberate expression of a hostile attitude on the part of some Indian "authority." The purely local and spontaneous character of the raid was never clearly recognized among members of a culture wherein violence against foreigners must be instigated, organized, and sanctioned by higher authority. Thus the Americans, like their Spanish predecessors, sought to eliminate these hostile activities by first dispatching diplomatic missions to the Navaho. These missions were invariably "successful." Some wealthy or influential Navaho could always be persuaded to affix his mark to a treaty signifying his peaceful intentions, and that of his people. However, it was seldom appreciated that when such a Navaho expressed his peaceful intentions toward the Americans or other outsiders, he spoke for his family and perhaps for his grazing community, but not for his "nation." Furthermore, he expressed merely his momentary attitude, and did not necessarily feel committed thereby in his future actions. Navaho social organization simply did not contain a system of authority

whereby any council of chiefs or elders could control the activities of the many clans and scattered grazing communities. The difference in time-orientation between Navahos and members of a European culture was a further source of profound misunderstanding. Navahos did not recognize present actions as implying future commitments to nearly the same degree as did Europeans, among whom the idea of contractual obligations was well established. It is partly because of cultural differences of this kind that the relations between the Navaho and the Spanish, and, later, American authorities tended to deteriorate rapidly following an initial period of friendly contact.

The earliest American descriptions of the Navaho express great respect for their wealth and industry, as well as their warlike character. Thus, Captain Reid, serving with Col. Alexander Doniphan's First Missouri Volunteers in New Mexico in 1846, compared the Navaho to the ancient Tartars, while Colonel Doniphan himself saw in the Navaho reflections of the Scottish Highlanders (Hughes, 1847, pp. 66 and 76). With the arrival of larger numbers of American settlers in the region, however, these early complimentary accounts tended to be replaced by references to the hostile Navaho raiding parties which periodically made their appearance in violation of whatever peace treaty happened to be in force at the time.³⁷ In response to these raids, punitive expeditions began to replace the earlier peaceful missions. These expeditions only increased the hostility of the Navaho without succeeding in engaging their warriors in decisive combat. However, they did greatly weaken the Navaho tribe by destroying crops and other property, and permitting the traditional enemies of the Navaho to carry out extensive raids into Navaho territory (Graves, 1867).

The American Civil War necessitated a weakening of the military forces in the New Mexico Territory, which led in turn to Indian raids of increased severity. Recognizing their inability to engage the Navaho in decisive action, the American authorities finally embarked on a campaign aimed at destroying their food supplies. In June 1863, Col. Kit Carson commenced a series of extensive forays through Navaho country, acting under specific instructions to destroy all crops, fruit trees, and livestock that could be found. This tactic succeeded beyond all expectations. By the following spring, the entire tribe had been brought to the verge of starvation. Carson sent his first prisoners back to their people to spread the word that those who surrendered would not be killed. Soon thereafter, the Navaho began to appear

³⁷ Many of the raids in this area were the work of Ute, Comanche, Apache, and other non-Navaho groups. The Navaho probably took more than their share of the blame because their greater number and the mystery surrounding their hidden "fortresses" gave them a reputation for great power. One report during this period referred to "competent" authorities as estimating the Navaho to number as many as 25,000 to 30,000 warriors—at a time when their total population could scarcely have amounted to half this number. (Bureau of Indian Affairs, 1863, p. 509.)

at Fort Defiance in large numbers, preferring captivity to the certain death that faced them on their homeland.³⁸

In the year preceding, the Americans had established an area along the banks of the Little Pecos River in southeastern New Mexico as a site for the concentration and maintenance of all captive Indians from the New Mexico territory. The locale was known to the Spaniards as Bosque Redondo (Round Grove). After renovating the small fort located there, the Americans renamed the place Fort Sumner. In 1863, some 400 Apaches were brought to this place in captivity. During the following 2 years, over 8,000 Navahos were to embark on the "long walk" to this fort.³⁹ The ensuing 4-year interval might be designated the "failure of a dream." General Carleton, in charge of all Indians in captivity at Fort Sumner, retained the notions of his Spanish predecessors that the Navaho and Apache might be transformed into peaceful agrarians. He instituted an ambitious program of agricultural development, hoping to establish at Fort Sumner a sort of Utopian, self-sufficient Indian community which would serve as a model for the eventual solution of the "Indian problem" throughout the frontier. In this community, the Indians were to be instructed in domestic and agricultural arts and crafts, following the pattern of life established among the Pueblo.

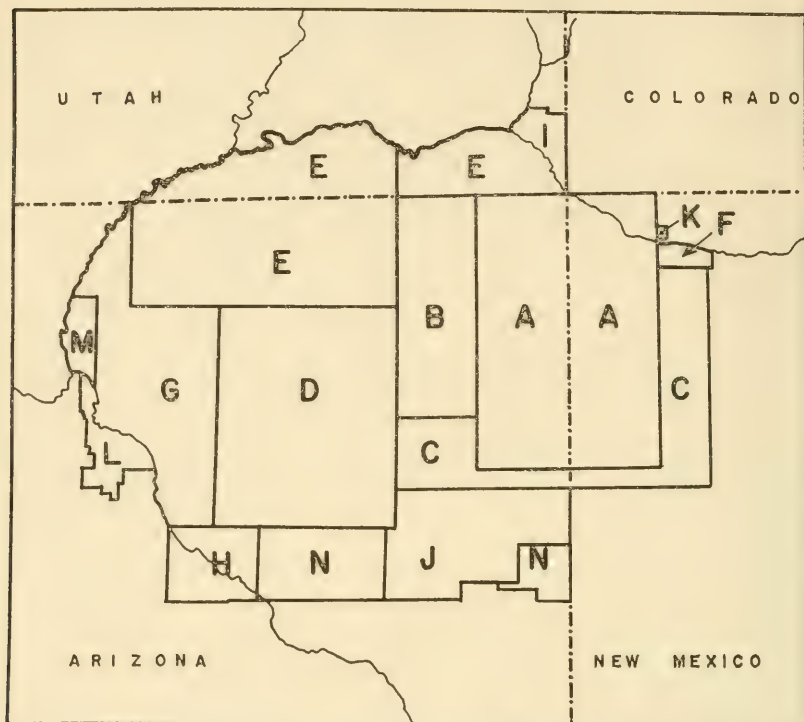
Initially, the Navaho appear to have reacted to the profound shock of their defeat and captivity with great resourcefulness and flexibility.⁴⁰ However, the entire program envisioned by Carleton was beset by failure on all sides. An invasion of caterpillars (known, appropriately enough, as "army worms") destroyed the first crop planted at the fort. Supplies of fuel were soon exhausted. Emergency appropriations for relief were largely dissipated through various forms of mismanagement and graft. Ultimately, the futility of the program

³⁸ The extreme vulnerability of the Navaho to a campaign directed against their agriculture is indicated by the fact that they, numbering at least 10,000 at this time, could in theory have brought close to 3,000 warriors against Colonel Carson. Carson's forces, on the other hand, numbered 736 officers and men, of whom only about two-thirds were mounted and armed. Nevertheless, this campaign forced the surrender of the bulk of the Navaho tribe after a small loss of life on each side. Underhill, 1956, ch. 10, pp. 112-126; cf. Carleton, 1867, pp. 247-257, wherein is given General Carleton's report to the effect that 301 Indians were killed in the hostilities preceding the surrender of the Navaho and Apache tribes.

³⁹ The Navaho captives were brought to Fort Sumner by several routes. The distance from Fort Defiance, where most of the Navahos surrendered themselves, to Fort Sumner was over 300 miles. This journey took several weeks, through lands unknown to the Navaho, and is still referred to by older Navahos as the "long walk." The plan of the fort and several photographs taken there during the period of Navaho exile are included in Underhill, 1953, pp. 166-175.

⁴⁰ Not the least of their problems was that of adjusting to the strange diet provided them by the Army commissary, which dumped sacks of flour and coffee beans among the Navaho with no instructions as to their preparation. The Navaho spent the better part of the first hard winter at Fort Sumner attempting various mixtures of flour and coffee beans, without making them in the least bit palatable. However, in their efforts to construct irrigation ditches and housing and to plant fields under Army direction, the Navaho bring to mind the response of the Manus to the equally profound changes affecting their culture two generations later.

became apparent even in Washington, and with the signing of a treaty of peace on June 1, 1868, the Navaho were allowed to return to their former lands (map 3).⁴¹



MAP 3.—Successive additions to the Navajo Reservation, 1869–1934. A, Treaty of June 1, 1868; B, Executive Order of October 29, 1878; C, Executive Order of January 6, 1880; D, Executive Order of December 16, 1882; E, Executive Order of May 17, 1884; F, Executive Order of April 24, 1886; G, Executive Order of January 8, 1900; H, Executive Order of November 14, 1901; I, Executive Order of May 15, 1905, and Act of March 1, 1933; J, Executive Orders of November 9, 1907, and January 28, 1908; K, Executive Order of December 1, 1913; L, Executive Orders of January 19, 1918, and May 23, 1930, and Act of June 14, 1934; M, Act of May 23, 1930; N, Act of June 14, 1934. (After Underhill, 1956, p. 149.)

For over a year after their return to the homeland, they remained in desperate straits. Those whose homes lay within the boundaries of the new reservation returned to find the ruin resulting from the war and 4 years of neglect. The remainder settled more or less at random

⁴¹The original reservation area established for the Navaho in the Treaty of 1868 was less than one-quarter the size of the territory they occupied prior to Fort Sumner. Thereafter, the reservation was gradually increased in size from 3.5 million acres in 1868 to its present area of about 15 million acres. See Underhill, 1956, p. 149, and also the inside cover of Kluckhohn and Leighton, 1951, for maps showing the growth of the reservation since 1868. The acreage is discussed in Young, 1954, p. 86.

wherever they could find ground enough to plant corn or graze the few sheep they retained. Late snows and drought again destroyed their initial crops, so that the Army was forced to continue the distribution of "emergency" rations at regular intervals. Finally, in the fall of 1869, a new beginning for the Navaho was signalized by the first general distribution of sheep at Fort Defiance.⁴² With characteristic initiative, the Navaho accepted their allotments of sheep and goats and resumed their herding activities in earnest.

During the following 30 years, three major outside influences affected the development of Navaho society: The traders, the railroad, and the Government agents. The traders appear to have been the only effective means of communication between Navahos and the outside world at this time. Their business success depended upon their ability to learn the language and customs of the Navaho. As a result, the trading posts tended to become centers of Navaho economic and social life, with the better traders serving as bankers, advisers, interpreters, and teachers in addition to their primary economic activities. By the end of the 19th century, weaving and silverwork had become important supplements to the livestock industry of the Navaho, owing in large part to the enterprise of a few traders who sought to exploit and further develop these skills among the Navaho. By importing prespun, predyed wool, the traders made it possible for the Navaho women to triple their output of rugs and blankets. Similar importations of silver and turquoise established the art of silverwork (which the Navaho had originally acquired from the Mexicans) as a profitable enterprise.

The arrival of the railroad in 1882 had the same general effect among the Navaho as it has had wherever it has made its appearance. Trade and commerce were greatly facilitated, the Navaho became less completely isolated from contacts with the outside world, and significant numbers of tourists began to assert their usual stimulus to the domestic crafts of the people. Whereas the traders provided the first impetus toward the development of an exchange economy among the Navaho, the railroad made such an economy technically feasible.

The influence of the Government agents during this period was somewhat less clear cut. Most of the agents were political appointees, so that they were typically unable to establish any program extending beyond the period of their own anticipated tenure.⁴³ A few of these appointees were seemingly very unsuited to be Indian agents, but the

⁴² This distribution was also the occasion for the first, and possibly the only, relatively successful census of the Navaho after their release from Fort Sumner. Captain Bennett (1870, p. 237), commanding at Fort Sumner, counted some 8,181 Navaho men, women, and children as they passed through the entrance to the corral to receive their allotments of the 15,000 sheep and goats that were issued to them at this time.

⁴³ Between the return of the Navaho to their former lands in 1868 and the end of the 18th century, 18 agents served their terms at the Navajo Agency, for an average tenure of less than 2 years (Underhill, 1953, p. 275).

fundamental limitation to their effectiveness was the indifference of the higher authorities in Washington to their needs. For example, the terms of the Peace Treaty in 1861 stipulated that every Navaho family head who agreed to establish a farm on the reservation would receive a supply of agricultural implements and seeds for a specified period following the establishment of his farm. Actually, the first shipment of hoes and axes did not arrive at Fort Defiance until 1882, a delay of 13 years!⁴⁴ Confronted with endless delays and misunderstandings, lacking facilities of any kind, most of the agents of this period confined themselves to the preparation of periodic reports on the condition of the Indians under their jurisdiction, and drafting pleas for greater material assistance. Their reports were duly filed and their pleas ignored or shelved. These agents were therefore unable to undertake any sustained ameliorative programs on the reservation at this time.⁴⁵

Despite the weakness of the Indian administration during this period, the Navaho gave ample evidence of significant progress by the end of the 19th century. They had attained a degree of economic self-sufficiency and even wealth which would scarcely have seemed possible immediately following Fort Sumner. In less than 30 years, they increased their livestock holdings from no more than 40,000 sheep and goats in 1870 to nearly 20 times that number, plus many thousands of horses.⁴⁶ Furthermore, significant beginnings were finally being made in the formal education of Navaho children, after the repeated failures of the 1870's and 1880's. This general development was reflected in the growth of the population itself, which had at least doubled in the generation following the exile to Fort Sumner.

It was only natural that most Navahos, and many White observers as well, regarded this impressive growth as proof of even greater prosperity to come. Actually, the flocks and herds of the Navaho were rapidly growing beyond the carrying capacity of their lands. By 1899, it was estimated that as many as half the Navahos were forced

⁴⁴ Underhill, 1953, p. 226. The shipment that finally did arrive in 1882 was both unique and inadequate.

⁴⁵ One notes the presence of an underlying moral dilemma here. The status of the Indian as a ward of the State was clearly anomalous in a society stressing individual initiative and self-reliance. At the same time, Christian ethics decreed a certain moral responsibility toward the Indian on the part of the society that had destroyed his former way of life. This dilemma is still in evidence in current debates concerning the issue of accommodation of Indian tribes as viable entities within the larger society versus assimilation of individual Indians into the mainstream of American life. See, for example, La Farge, 1957, and Watkins, 1957.

⁴⁶ The records are unclear as to the livestock holdings of the Navaho immediately following their captivity at Fort Sumner. Dunn (1958, p. 403) summarizes their holdings in 1867 as reduced to 550 horses, 20 mules, 940 sheep, and 1,025 goats, held by about 7,300 Indians. Underhill (1956, p. 155) states that the Navaho retained about 2,000 sheep and goats upon their return from the fort. Both Underhill (1956, p. 155) and Kluckhohn (Kluckhohn and Leighton, 1951, p. 33) mention an issue of 14,000 sheep and 1,000 goats in 1869, but Hodge (1910, p. 42) referred to a total Government issue of some 30,000 stock at this time.

to seek pasturage beyond the confines of the reservation and were in fact in permanent residence outside the reservation boundaries (Underhill, 1953, p. 235). With overgrazing had come soil erosion. This in turn further restricted the amount of grazing land available. The vicious cycle which was to become familiar in the "dust bowl" regions elsewhere in the United States was already in operation in Navaho country by the beginning of the 20th century. The only existing authority that might have applied preventive measures at this early stage was the Bureau (then Office) of Indian Affairs, but once more the periodic reports that were submitted through channels brought no response.⁴⁷ The only tangible result of these continuous reports of land shortage was the official recognition by Washington of the de facto occupation of off-reservation lands by Navahos. The boundaries of the reservation were extended in a series of legislative enactments (map 3, p. 24).⁴⁸

Unfortunately, these increases in the size of the reservation had little effect on the fundamental imbalance between Navaho livestock holdings and their land resources. The very facility with which the Government was able to extend the reservation boundaries testifies to the poverty of the land in question. Furthermore, as was noted earlier, the Navaho were already in de facto occupation of much of this land. Finally, it should be noted that with the rapid rise in the Navaho population, their per capita land holdings remained, in 1930, at about the same point where they had been in 1870, while the average quality of this land had declined considerably (van Valkenburgh and McPhee, 1938, pp. 49 f.).

The cumulative effects of unregulated livestock expansion and Governmental neglect finally were felt in Washington when, during the 1920's, a number of investigations into the Bureau of Indian Affairs and conditions prevailing among the several Indian reservations were carried out.⁴⁹ These investigations eventually gave rise to the development of a new policy toward the American Indian, initiated by reorganization of the Bureau in 1933 and the enactment of

⁴⁷ No responsible governing body of Navahos was in existence at this time. The Navajo Tribal Council was not organized until 1923, and remained largely a nominal body until after World War II. See Young, 1954, pp. 77 ff.

⁴⁸ See footnote 41, p. 24. These extensions to the Navajo Reservation are especially noteworthy in view of the fact that they were contrary to the prevailing policy of opening increasing segments of Indian lands to outside settlement. In the period 1870 to 1900, the Navajo Reservation was increased to about three times its original size. During this same period, the amount of land included in all Indian reservations in the United States was reduced from 138 million to 52 million acres. Similarly, the Navajo Reservation was increased in size by a further 50 percent from 1900 to 1933, while the size of all Indian reservations in the country underwent further reduction to 29 million acres. This loss of Indian lands held by the Indian tribes during this period is summarized in Adams, 1946, p. 59.

⁴⁹ These several investigations culminated in the voluminous report, Meriam et al., 1928. The studies reported therein were conducted by the Institute for Government Research. At about the same time, the U.S. Senate began a long series of hearings on this general problem.

the Indian Reorganization Act in the following year. Although the provisions of this act did not formally apply to the Navaho, who had rejected it by a narrow margin in referendum, most of its aims found expression in the many programs that were put into effect on the Navajo Reservation by the Navajo Agency, the Soil Conservation Service, and other Government agencies during the 1930's (Young, 1955, p. 115).

In applying the recommendations of the Meriam Report and other surveys as they pertained to the Navaho situation, the several programs initiated under the Collier Administration after 1933 sought to accomplish three major objectives. First, an extensive program of stock reduction was to be carried out, and rigid limitations upon further increases in stock holdings were henceforth to be enforced. Secondly, a number of soil conservation measures were to be established. Finally, the Navajo Tribal Council was to be organized into an effective and responsible executive body for the eventual direction of Navaho affairs on a representative basis.

A rational basis for determining the amount of stock reduction necessary in each range district was established by means of a survey of range conditions throughout the reservation area. This area was then divided into 18 land management districts and the carrying capacity of each district was estimated in terms of "mature sheep units."⁵⁰ The reduction program was therefore aimed at bringing the stock holdings in each district to a figure approximating its estimated carrying capacity. In pursuit of this objective, the livestock holdings of the entire Navajo Agency area (which includes the Hopi Reservation) were reduced from about 1 million mature sheep units in 1933 to about 720,000 units in 1937 (Young, 1955, p. 187).

This program gave rise to much resentment and resistance among the Navaho, who understood only that in slaughtering their sheep and horses, "Washington" was destroying, at a single stroke, both their means of livelihood and their greatest source of pleasure and prestige. This resistance might have been anticipated, in view of the suspicion the Navaho had earlier manifested toward the boarding-school system inaugurated in the 19th century.⁵¹ Unfortunately, all

⁵⁰ In calculating this unit, mature sheep and goats count one unit each, mature cattle count four units each, and mature horses count five units each. These ratios are roughly proportional to the amount of forage consumed by each type of animal. In general, each land management district was defined in terms of the prevailing watershed.

⁵¹ It must be stressed that the stock reduction program was in every sense a "crash program" aimed at overcoming an intolerable situation as quickly as possible. Under these emergency conditions, adequate educational preparation could not be undertaken. It should be noted, further, that all animals were traditionally evaluated by the Navaho on a strictly numerical basis, without regard to quality. Thus any reduction in the number of one's livestock holdings was bound to be interpreted as a loss of wealth, despite the ultimate improvement in the quality of the stock which might result from such reduction in numbers. The greatest resentment was apparently aroused by the slaughtering of Navaho horses, despite the fact that these animals were of little economic worth by this time. It is clear that the Navaho's horse, like the American's automobile, cannot be evaluated within a simple framework of economic rationality.

rational explanations of the necessity of the program were nullified by growing hostility. As a result of this failure in "public relations," many Navahos acquired a resentment of the "Government" which has lasted to the present day. Although the main objectives of the program were attained, it was accompanied by much passive resistance and general apathy, in place of the earnest cooperation which had been hoped for.

The efforts at soil conservation and general land rehabilitation were more rewarding. Many Navahos found work with the Civilian Conservation Corps, Public Works Administration, and similar agencies, and were employed in the construction of roads and water facilities throughout the reservation. One of the significant results of these activities was the establishment of new skills and attitudes among the Navaho, many of whom experienced their first contact with machinery, money wages, and the attendant opportunities and responsibilities. It should be noted in this connection that the majority of Navahos who participated in these projects were younger males who reacted with characteristic eagerness to the challenge offered by these programs and ideas. On the other hand, the chief "victims" of the stock reduction program were for the most part older and more conservative in their outlook.⁵²

The organization of the Tribal Council into a truly responsible and representative body, finally, was accompanied by considerable delay, owing partly to the rejection by the tribe of the provisions of the Indian Reorganization Act of 1934. Nevertheless, repeated attempts at reorganizing the previous council were ultimately successful, and the "Rules for the Navajo Tribal Council" were promulgated in 1938. These rules set the stage for the eventual development of the council into an autonomous governing body. With formation of the new Tribal Council, the three major objectives of the Collier Administration were attained, although the ultimate success of the related programs remained to be determined.

The impact of the Second World War upon the Navaho cannot as yet be fully assessed, but it is evident that the war greatly accelerated the bridging of the gap between Navaho culture and that of the general American society. About 3,600 Navahos served in the Armed Forces during the war, out of a total Navaho population of about 50,000. Many others participated in war industry, and still more responded to the heightened opportunities for off-reservation agricultural employment.⁵³ For many of these people, the war provided their first exten-

⁵² It should be added, however, that the impact of the stock reduction program was particularly severe among the small stockholders in the Navajo Extension Area.

⁵³ Kluckhohn and Leighton (1951, p. 75) estimated that about 20,000 Navahos left the reservation for various types of wartime employment, including military service, during the war.

sive association with Whites on an equal footing. It also gave them a general sophistication and acquaintance with the outside society which a few years of formal schooling could not possibly provide. Perhaps the most significant development that came out of the war, in the long run, was the insight it gave many younger Navahos into the values and opportunities inherent in modern ways of life.

Since the war, the most significant progress has been in the field of education, which was generally overlooked until about 1895 and inadequately provided for thereafter (see pp. 46-60). The great lag in the formal education of the Navaho was clearly revealed through the operation of the Selective Service System during World War II, when 88 percent of the 4,000 male Navahos aged 18 to 35 were classified as illiterate. At this time (1942-43) less than 30 percent of the children aged 6 to 18 inclusive were enrolled in school.⁵⁴

After the war, an intensive program of school construction was undertaken, and considerable effort was expended to bring the school-age children into the schools. In addition, special programs of adult education were inaugurated. The remarkable success of these efforts is indicated by the following figures on total Navaho school enrollments: 1939—5,308; 1951-52—13,883; 1955-56—25,287; and 1960-61—30,650. The enrollment figure for the 1960-61 school year includes 28,824 enrollees aged 6 through 18 years. The total Navaho population in this age group at this time can be roughly estimated by taking the total count of Navahos aged 7 through 19 as of December 7, 1961, and ignoring mortality. This total comes to 31,238. Thus, even if we assume that no Navahos were enrolled in schools outside the administrative jurisdiction of the Navajo Agency, it would appear that over 92 percent of all Navahos aged 6 through 18 years were enrolled in school by 1960. This enrollment rate is especially noteworthy when compared with that of the corresponding age group for the U.S. population as a whole in 1960—90.8 percent.⁵⁵

In concluding this brief outline of the history of the Navaho, the following salient features should be emphasized:

⁵⁴ Kluckhohn and Leighton, 1951, pp. 91 and 93. The official statistics of the Navajo Agency for this period show a considerably higher percentage of Navaho children in school, owing to a considerable amount of duplicate counting of children who appeared at different schools at different times, and to a serious underestimate of the number of Navahos of school age. The official figures are presented in Young, 1954, p. 104. The Kluckhohn-Leighton estimates, derived from the figures of Dr. Solon Kimball, are more reliable for the period of the early 1940's.

⁵⁵ Young, 1961. The school enrollment figures are summarized on p. 65; the total Navaho population as of Dec. 7, 1961, by single years of age and sex, is given on p. 331. The enrollment rate for persons aged 6 through 18 years in the United States in 1960 is derived from the Bureau of the Census, 1963 a, table 165.

It may be surmised that the 1961 estimate of the total Navaho population is not itself independent of the results of the earlier school censuses. In other words, young Navahos who are not enrolled in school may have been omitted from the enrollment records as well. Nevertheless, if the actual enrollment figures can be accepted at face value, they would imply that a very high percentage of school-age Navahos are enrolled in school at this time.

1. In the 30 years following their return to their original homeland, the Navaho clearly demonstrated their remarkable vigor in recovering so rapidly from the cultural shock of military defeat and captivity, almost without outside assistance.

2. During the next 30-year period (1900 to 1930), we witness the seeming paradox that this selfsame vigor brought the Navaho to the verge of disaster, as their increased population and stock holdings dangerously exceeded the carrying capacity of the reservation lands.

3. Since 1930, extensive programs of economic rehabilitation and education have been established on the reservation, while the Second World War greatly speeded the process of acculturation.

A SUMMARY OF NAVAHO ECONOMIC DEVELOPMENT

In order to appreciate the conditions under which the Navaho have traditionally pursued a livelihood, a summary of the climate and physiography of the region they inhabit is in order (see Gregory, 1916; Young, 1954, pp. 56-69; 1955, pp. 92-104; and 1961, pp. 348-356). The country of the Navaho can be generally described as falling into three zones: Mountain, steppe, and desert. About 8 percent of the total land area of the reservation is classified as mountainous. The climate in this zone is cold and humid, the elevation being from 7,000 to 10,000 feet. The average annual temperature of this zone is between 43° and 50° Fahrenheit, and winter temperatures fall well below zero. Annual rainfall is between 16 and 27 inches; 41 percent of the precipitation falls as snow.

About 37 percent of the total reservation area is classified as steppe. The temperature here varies between an average low of 10° to 25° in the winter months to an average high of 80° to 88° in the summer. Annual precipitation is from 12 to 16 inches; 25 percent falls as snow.

The remaining 55 percent of the country is classified as desert. Here, the average winter temperatures are between 11° and 30°, while the summer temperatures rise as high as 110°, averaging 100° in some localities. Total annual rainfall in this zone is between 7 and 11 inches in most years, but it may be as low as 1.5 inches and as high as 16 inches.

An important characteristic of the precipitation that falls in both the steppe and desert zones is its high intensity and short duration, producing sudden runoffs and flooding low areas. Furthermore, since about 80 percent of the days on the reservation are clear and sunny, evaporation causes the loss of much of this precipitation.

The soils of the region are classified as 33 percent "excellent or good," 29 percent "fair," and 23 percent "poor." The remaining 15 percent is considered to be totally unproductive. Nearly all of these soils can only be used for growth of livestock forage. Land suitable for agriculture is found only in the mountainous and steppe zones and

amounts to no more than 220,000 acres, of which about 45,000 acres are actually under cultivation at present. Thus, of the 15 million acres of reservation land, only about 1.5 percent is suitable for agriculture while about 0.3 percent is actually cultivated (Young, 1955, pp. 99-102).

The resultant emphasis by the Navaho upon livestock has had an important impact upon their social organization. In his article on Navaho political organization, Willard W. Hill (1940 b, p. 23) has stressed the importance of the grazing community as a unit both for economic and social functions among the Navaho. Other students of Navaho social organization have recognized the land-use community as the only major indigenous social institution which extends beyond the boundaries of the Navaho family and clan. These land-use communities are composed of a group of families who have developed a stable pattern of cooperative land use whereby their flocks and herds can share specified grazing lands in common (Thompson, 1951, pp. 35 f.; cf. Provinse, 1940).

In their traditional organization, the Navaho appear to have evolved a dual political system. Major economic activities centered around the land-use community and were supervised by the most experienced herdsmen in the group. Raids, on the other hand, were instigated by individuals whose qualifications consisted mainly in ritualistic skill. As a result, the economic welfare of the group could be sustained independently of its raiding activities.⁵⁶ This dual organization appears to have given the Navaho an unusual degree of flexibility and enabled them to enjoy a relatively high level of general prosperity despite the harshness of their natural environment.

Although the herding activities of the Navaho force them to move periodically to higher or lower levels of pasturage in the spring and autumn, respectively, the extent of their "nomadism" should not be exaggerated. This seasonal movement, known as "transhumance," should not be confused with true nomadic wandering. Actually, the Navaho practiced considerable agriculture prior to the Fort Sumner period (Phelps-Stokes, 1939, p. 7). Furthermore, the movement of the flocks to new pastures is neither a random wandering nor a true migration, but rather a scheduled movement to a specific locality, sanctioned by established patterns of land use for the given grazing community. As Hill (1938, pp. 33 f.) points out, the only Navaho population shifts which ignored the prescribed patterns of land use were the occasional movements in search of piñon nuts and other fruits, and the frequent journeys to engage in social gatherings. Thus,

⁵⁶ Hill, 1940 b. For a more detailed analysis of Navaho political organization see Hill, 1938, and Boyce, 1939. An account of Navaho raiding and fighting techniques is given in Hill, 1936.

the Navaho economy is characterized by transhumance wherein each grazing community is identified with a specific locality.

Prior to Fort Sumner, the Navaho had long enjoyed a reputation for relative wealth and prosperity. As mentioned previously, most of the early references to the Navaho allude to their large flocks and herds and their general industry.

The following quotation from the report of the Hon. D. Merriwether in 1854 is typical of these early appraisals: ⁵⁷

... the Navajoes . . . raise an abundance of corn and wheat . . . [and] have numerous herds of horses and sheep, and some horned cattle and mules, and . . . live in a degree of comfort and plenty unknown to the other wild Indians of this section of the Union. [Merriwether, 1855, p. 172.]

By 1861, however, the Navaho had begun to suffer seriously from the effects of their intermittent warfare with the Americans, whose punitive expeditions permitted the traditional enemies of the Navaho to settle old scores. The report of that year referred to the severe loss of property by the Navaho, and especially of their loss of many women and children made captive in the punitive expeditions of the previous year (Graves, 1862). In 1866, the report of J. K. Graves, Special Agent Relative to Indian Affairs in New Mexico, detailed the practice whereby the volunteers who participated in these expeditions into Navaho territory were allowed to sell their captives in Mexico or hold them in "practical slavery." Graves estimated that the cumulative effect of these hostilities was to reduce the total Indian population of the territory from about 38,000 in 1846 to about 20,000 in 1866. He further estimated that the Navaho, included in the above figures, had themselves declined from about 13,500 to about 7,600 in the same period (Graves, 1867). Although it is now clear that this report greatly exaggerated the effectiveness of the warfare conducted against the Navaho and other Indians in the territory, it is nevertheless evident that the Navaho had been considerably weakened before Carson brought them to final defeat in 1863.

It can be safely presumed that the Navaho commenced the post-Summer period with very little of their former wealth. Their fields had been ravaged both by the campaigns of Carson and the effects of 4 years of neglect. The information relative to their livestock holdings at this time is not clear. They definitely received an issue of 15,000 sheep and 2,000 goats in 1869. In addition, they may have received as many as 15,000 sheep in subsequent issues shortly thereafter.⁵⁸ They also retained at least 2,000 sheep from their period of

⁵⁷ See, for example, Hughes, 1847, pp. 66 and 76. The high valuation placed upon general industriousness and the accumulation of wealth for communal benefit in traditional Navaho culture is substantiated in Hobson, 1954, Summary, pp. 28 f.

⁵⁸ Hodge (1910, p. 42) estimated the total Government issue at 30,000 sheep and 2,000 goats, but specific mention is made of only half this number. [See footnote 46, p. 26.]

exile at Fort Sumner. Finally, the indefinite number of Navahos who were never captured must have possessed additional flocks and herds. In any case, the annual report of 1872 indicated a rapid increase in their livestock holdings, giving estimates of 130,000 sheep and 10,000 horses.⁵⁹ This same report gave the size of the Navajo Reservation as 3,328,000 acres, which was less than 25 percent of the territory claimed by the Navaho 20 years previously. This point is economically significant in that it indicates the severely reduced land base on which the Navaho were expected to pursue a livelihood after their return from Fort Sumner. The inadequacy of this reservation was apparent even in the 1870's when many Navahos took up residence outside the boundaries of the reservation.

Despite these official limitations on their land base, the Navaho continued to expand their livestock holdings during the following decades.

By 1880, these holdings were estimated at 1,000,000 sheep and goats plus 40,000 horses and about 1,000 mules and cattle.⁶⁰

The first official recognition of the fact that this rapid growth posed a threat to the tribe's economic stability came in 1883. Dennis M. Riordan, perhaps the outstanding Indian agent to have served the Navaho, included the following appraisal in his annual report for that year:⁶¹

They have too many sheep. The number could be reduced fully one-half (I believe, two-thirds) with benefit to the tribe. . . .

They have an enormous number of useless ponies As the Navahos measure a man's wealth by the number (regardless of quality) of horses he has, a radical change in their modes of thought must be brought about before much improvement can be made in this regard.

This warning of coming troubles, like so many later warnings, evoked no really appropriate response from the officials in Washington. Rather than addressing themselves to the fundamental problem of controlling the expansion of livestock holdings, the authorities sought to further extend the reservation boundaries. By 1890, the reservation included an area of 8,205,440 acres, but much of this additional land was either worthless or already being utilized by the Navaho before it was officially added to their reservation. Meanwhile, although the Navaho holdings of sheep and goats did not materially increase over the 1880 figure, they had increased their herds of horses

⁵⁹ Bureau of Indian Affairs, 1872, p. 52. If this estimate of Navaho livestock holdings is even roughly correct, it implies an increase of 300 to 400 percent in less than 3 years.

⁶⁰ Bureau of Indian Affairs, 1880, p. 268. Much credence cannot be given these annual estimates of stockholdings. Their great variation from year to year may reflect either the vagaries of winter and forage conditions or the vagaries of the reporting agents. A summary of the development of livestock agriculture among the Navaho is included in Fryer, 1940.

⁶¹ Riordan, 1883, p. 122. An account of the conditions faced by Riordan and other Navaho agents at this time is given in Underhill, 1956, pp. 171 ff.

to about 120,000 head, which of course seriously reduced the amount of grazing land available for the sheep.⁶²

The first summary of economic conditions among the Navaho was provided by Special Agent D. L. Shipley, pursuant to the provisions of the Eleventh Census of the United States in 1890. This census included the first special enumeration of Indians carried out in this country. A total of 17,204 Navahos were enumerated at this time, of whom 16,102 were reported by Agent Shipley to be residing under his jurisdiction. The economic data shown in table 1 are selected from Shipley's summary report (MS., 1891) and pertain to the population under his jurisdiction only.

TABLE 1.—*Selected economic characteristics, Navaho tribe—1891*¹

Total agency population.....	16, 102
Acres of land on reservation.....	8, 000, 000
Acres fit only for grazing.....	4, 000, 000
Acres of tillable land (with irrigation).....	400, 000
Acres cultivated during the year (approximate).....	5, 000
Total value of produce raised by the Indians.....	\$36, 336. 00
Value of stock owned and used by the tribe:	
Horses (118,798).....	\$1, 187, 980. 00
Mules (500).....	\$5, 000. 00
Cattle (9,188).....	\$151, 820. 00
Sheep (1,583,754).....	\$1, 979, 692. 00
Total value of stock.....	\$3, 324, 492. 00
Per capita value of stock.....	\$206. 46

¹ Shipley, MS.

The annual reports for the succeeding years provide little additional information on the economic status of the Navaho until 1910, when the Bureau of the Census carried out its second special enumeration of Indians in the United States. At this time, a total of 22,455 Navaho were reported.⁶³ The enumerators also obtained information on the occupational distribution of adult Indians, and their findings in regard to the Navaho tribe are summarized in table 2.

It is interesting to note that the Navaho ranked eighth among the 44 tribes for whom occupational data were obtained, in the proportion of males aged 10 years and over engaged in gainful occupations. But in the proportion of females so engaged, the Navahos ranked first, and were the only tribe reporting over half of its female population aged 10 years and over as engaged in gainful occupations. The importance

⁶² Bureau of Indian Affairs, 1889, p. 522. This report estimated the number of horses owned by the Navaho at about 250,000, but the more detailed report of 1891 suggests that this was an overestimate.

⁶³ Both this figure and that of the 1890 census were later criticized as faulty. See pp. 103 ff. for further discussion of this point.

of the weaving industry among the Navaho at this time is clearly indicated in table 2.⁶⁴

TABLE 2.—*Navahos aged 10 years and over in selected gainful occupations, by sex—1910*¹

Item	Males		Females	
	Number	Percent	Number	Percent
Aged 10 years and over.....	7,429	100.0	7,368	100.0
Engaged in gainful occupations.....	5,148	69.3	4,564	61.9
Farm laborers.....	1,145	15.4	19	.3
Farmers.....	387	5.2	7	.1
Gardeners.....	248	3.3	8	.1
Stock herders.....	1,583	21.3	332	4.5
Stock raisers.....	1,290	17.4	102	1.4
Weavers.....	102	1.4	4,005	54.4
All others.....	393	5.3	91	1.2

¹ Bureau of the Census, 1915, tables 103 and 109.

The next pertinent detailed compilation of economic data occurred in 1915, when Peter Paquette, then Superintendent of the Navajo Agency, conducted a special census of the Navahos within his jurisdiction. The actual area covered in this enumeration comprised less than half of the total reservation area, and the 11,915 Navahos reported at this time probably amounted to no more than 40 percent of the total Navaho population in 1915.⁶⁵ Insofar as these persons are representative of the total Navaho population, the data in table 3 suggest an important trend in the economic status of the Navaho during the period 1890 to 1915. Dividing the total stock valuation by the corresponding population figure in 1915 gives a per capita stock valua-

TABLE 3.—*Number and value of stock holdings, Navajo Agency jurisdiction—1915*¹

Type and number of stock	Average value per head	Total valuation (thousands)
Sheep; 406,316.....	\$3.25	\$1,321
Goats; 116,202.....	.75	87
Cattle; 14,406.....	30.00	432
Horses; 26,255.....	25.00	656
Burros; 2,116.....	2.00	4
Mules; 435.....	20.00	9
Total stock valuation.....		\$2,509

¹ Paquette, MS.

⁶⁴ The reader should note that the data shown in tables 1 and 3 pertain only to the Navajo Agency population, while those given in table 2 pertain to the entire enumerated Navaho population. In regard to the high proportion of Navaho women reported as engaged in gainful occupations, it should be observed that the 1910 census failed to recognize beadwork as a gainful occupation, thus producing relatively low proportions of gainfully employed females in other Indian tribes.

⁶⁵ Paquette, MS. The Annual Report of the Commissioner of Indian Affairs for the year 1915 (table 3) gives the total Navaho population as 30,871. Thus the Navahos included in Paquette's report constituted 38.6 percent of the total estimated Navaho population at this time.

tion of \$210.69. Thus the per capita dollar value of the Navaho livestock holdings was about the same in 1915 as it was 25 years earlier. However, the reader should note that during this period, the dollar value of sheep increased by 160 percent, from \$1.25 a head in 1890 to \$3.25 a head in 1915. Other livestock experienced similar increases in dollar value. Hence the real value of these livestock holdings must have declined seriously during this period.

Paquette's report also included some information on the estimated value of other property and resources held by the Navaho tribe at this time. His summary was one of the first indications of the great stores of natural wealth contained in Navaho country.⁶⁶ On the basis of the value of the agricultural products from the land under cultivation by Navahos in 1915, Paquette estimated the average value of all land held by the Navahos under his jurisdiction as about \$4.00 per acre, instead of the \$1.50 figure commonly assumed. This gave a total value of \$12 million for the 3 million acres included in his study. He further estimated the value of all personal property and monies owned by Navahos at about \$430,000. Summing the values he estimated for the land, livestock, and personal property held by the Navahos under his jurisdiction in 1915, we obtain a total of \$14,940,000, or about \$1,250 per capita.

However, it was the untapped natural resources of the Navaho country that suggested the true wealth of the tribe. The merchantable timber resources of the Paquette jurisdiction were estimated at 3 billion feet, having a total stumpage value of \$7.5 million. The value of the known coal deposits, estimated on the basis of an assumed royalty to the tribe of 1 cent per ton, came to \$167 million.⁶⁷ These latter figures were highly speculative, but they did serve as an early indication that the Navaho would find a large proportion of their future income in the exploitation of their natural resources rather than in their traditional livestock and agricultural activities.

The Meriam Report, the recommendations of which underlaid many of the developmental programs carried out in the 1930's, provided additional information on the economic status of the Navaho as of 1926, the year of their survey in that area. Table 4 includes summary data on property valuations and income obtained by combining the reported figures for the several Navaho jurisdictions (Meriam et al., 1928, pp. 442, 445, 452, 455, 544).

Although all comparisons of the data with previous figures must be viewed with extreme caution, it is apparent at least that the population of the Navaho was increasing at a faster rate than its

⁶⁶ Paquette's information was evidently derived from the findings of Gregory's geological survey which was conducted at this time.

⁶⁷ The first oil and natural gas deposits on the reservation were not discovered until several years after this report of Paquette's.

economic assets during the period from 1915 to 1926. Whereas Paquette estimated a total per capital value of all property held by the Navahos under his jurisdiction of \$1,250 in 1915, the corresponding figure obtained in the Meriam Survey of 1926 comes to only \$1,058.⁶⁸

TABLE 4.—*Income and property valuation, all Navajo Agency jurisdictions combined—1926*¹

Item	Total income or ownership	Individual in- come or own- ership	Tribal income or ownership
Value of Indian property reported.....	\$32,222,820.00	\$5,461,650.00	\$26,761,170.00
Per capita value of Indian property ²	1,058.46	179.40	879.06
Reported Indian annual income.....	3,301,922.00	3,112,511.00	189,411.00
Per capita Indian income ²	108.46	102.24	6.22

¹ Meriam et al., 1928, pp. 442, 445, 452, 455, 544.

² The combined population of the several Navajo Agency jurisdictions as estimated in this survey was 30,443. This figure was used in computing the per capita figures for income and property valuation.

The first economic surveys of the Navaho to extend beyond the superficial stock enumerations and property evaluations of the former reports occurred in the period 1936-40. At this time, the Soil Conservation Service carried out an elaborate program of development and rehabilitation on the Navajo and Hopi Reservations. As a necessary adjunct to this program, a Human Dependency Survey was undertaken.

This survey was aimed at providing up-to-date information on the economic condition of the Indian population in the several land management districts. The findings of the initial survey were summarized in a statistical report dated August 1938. Subsequent data and corrections led to the issuance of a revision in May 1939, and further fieldwork led to the issuance of a final statistical summary in October 1941 (Soil Conservation Service, 1938; Bureau of Indian Affairs, 1941 b).

In table 5 selected data from the two later statistical summaries of the Human Dependency Survey are combined with more recent data from later sources to present a summary of economic trends on the reservation during the past 20 years. These data, like those presented earlier, are only roughly comparable because of certain changes in the basis of classification employed in the several reports. Furthermore, comparisons or evaluations of quantities expressed in dollar terms are frequently misleading because of the decline in the value of the dollar during the period in question. Nevertheless, it is possible to draw certain tentative conclusions from the data in table 5. The first point to be noted is the increasing density of the reservation population. In

⁶⁸ This comparison must be viewed with caution, because precise information is lacking as to the composition of the respective categories.

view of the necessity of stock limitation, this rise in population implies a decline in per capita livestock holdings and hence a relative decline in per capita income from these holdings. This means, in turn, that

TABLE 5.—*Selected economic characteristics, Navajo Reservation—1936, 1940, 1950, and 1955*

Item	1936 ¹	1940 ²	1950	1955
Area of reservation (square miles) ³	22,931	22,810	22,794	22,794
Total reservation population.....	32,098	39,999	⁴ 54,997	⁵ 61,469
Population density per square mile.....	1.40	1.75	2.41	2.70
Total commercial income (in thousands) ⁶	\$3,166	\$2,348		
Livestock.....	970	1,046	\$4,117	
Agriculture.....	60	72		
Wages.....	1,547	892	11,970	\$16,688
Other.....	589	337		1,898
Total noncommercial income (in thousands) ⁶	1,293	804		
Total gross income (in thousands) ⁷	4,459	3,152	18,086	26,530
Livestock.....	1,386	1,401	5,572	4,000
Sheep.....	1,165	1,129		
Goats.....	87	99		
Cattle.....	134	151		
Horses.....		22		
Agriculture.....	937	52	544	16,688
Wages ⁸	1,547	892	11,970	
Other ⁸	589	337		5,842
Livestock holdings in mature sheep units ⁹	702,073	621,584	460,526	497,769
Sheep.....	379,078	356,791		257,042
Goats.....	57,679	57,113		55,945
Cattle.....	69,521	52,180		50,332
Horses.....	195,795	155,500		134,450
Total livestock income per sheep unit: ¹⁰				
Sheep.....	3.07	3.16	7.77	
Goats.....	1.51	1.73	4.88	
Cattle.....	1.93	2.89	9.45	
Horses.....		.14	.37	
Total livestock income, per capita ¹¹	43.18	35.02	101.31	
Total gross income, per capita ¹²	138.92	78.13	328.85	431.60

¹ Soil Conservation Service, 1936, tables 1, 3, 7, 14, 17, 18.

² Bureau of Indian Affairs, 1941 b, tables 1, 3, 7, 18, 19.

³ The discrepancies in the reported area of the Navajo Reservation prior to 1950 arise from the fact that no authoritative survey of the area had been completed (Young, 1955, pp. 90 and 92). The figures shown are obtained by subtracting the area of the Hopi land management unit (reported as 780 square miles) from the total Navajo-Hopi Reservation area reported.

⁴ Bureau of Indian Affairs, 1954 a, table 2.

⁵ Estimated by using the reported 1950 population as a base and assuming an average annual increase of 2.25 percent. This rate is given by Young (1955, p. 142) as the most plausible rate of increase at the present time.

⁶ For 1936, see footnote 1 above. For 1940, see footnote 2 above.

⁷ For 1936 and 1940, this is the sum of the previous two entries. For 1950 and 1955, the figures given are estimates obtained by summing the following entries (see footnote 8, following).

⁸ The reported wages for 1950 is an estimate of total income from all off-reservation employment for the year 1950-51 (Young, 1955, p. 189; 1954, p. 123 f.). Similar income figures for 1951 and 1952 come to \$13,681,000 and \$14,095,000 respectively. Income from "other sources" reported for 1936 and 1940 is primarily from the production of rugs and silverwork. For 1955, the income was estimated by a more arbitrary procedure. Gross income from livestock and agriculture is quoted as given in Young, 1955, p. 65. Income from wages and from other sources is estimated by assuming that 75 percent of the total income in these categories accrues to the reservation Navaho population.

⁹ Only the total livestock holdings are reported for 1950 (Young, 1955, p. 197). All these figures are in "mature sheep units." These are computed according to the following ratios: One sheep or goat equals one unit; one head of cattle equals four units; and one horse equals five units. These ratios correspond approximately to the forage consumption of each class of stock.

¹⁰ For 1936 and 1940, these figures are computed by dividing the income reported for each class of stock by the total holdings, in sheep units, reported for that class. The figures given for 1950 are a 10-year average for the decade 1941-50, as given in Young, 1954, p. 114.

¹¹ Obtained by dividing the total reported livestock income for the given year by the reservation population in that year.

¹² Obtained by dividing the total gross income for the given year by the reservation population in that year.

if the level of living of this reservation population is to be maintained, it must either send an increasing proportion of its people to permanent off-reservation residences, or it must derive an increasing proportion of its income from nontraditional means of livelihood (Boyce, 1942, Preface).

A second noteworthy feature in table 5 is the evident reversal of the trend toward reduced livestock holdings. In the original Soil Conservation Survey, the carrying capacity of all the grazing lands on the reservation was estimated at 512,922 mature sheep units.⁶⁹ Assuming that this capacity remains constant for the period in question, we find that the livestock holdings of the Navaho declined from about 137 percent of capacity in 1936 to about 90 percent of capacity in 1950. These holdings increased until 1955 when they stood at 97 percent of the carrying capacity of the reservation lands.⁷⁰ It is evident that further increases in these holdings would have a deleterious effect on the quality of the stock.

The third point to be noted in table 5 relates also to livestock holdings—the evident unwillingness of the Navaho to seriously reduce their herds of horses, despite the obvious economic disutility of these animals. The proportion of grazing land devoted to horses has, in fact, increased slightly between 1940 and 1955; from about 25 percent to about 27 percent.⁷¹ Thus, the horses of the Navaho continue to exert an important drain on their livestock economy at the present time.

One final observation should be made regarding the data in table 5. Inspection of the figures on gross and commercial income reveals a significant increase in the proportion of income derived from wages and other nonagricultural activities since 1936. In that year wages and other nonagricultural pursuits accounted for 48 percent of the gross income of the Navaho. In 1950, the corresponding proportion had risen to at least 67 percent.⁷² The tentative income estimates for 1955 suggest a further increase in this proportion, to about 85 percent. This clearly indicates that the efforts to reduce the dependence of Navahos on their traditional herding and farming occupations have attained a measure of success since World War II.

Since the end of the Second World War, a second program of economic rehabilitation has been undertaken on the Hopi and Navajo

⁶⁹ Young, 1955, p. 191. The original estimate of the carrying capacity of the respective land management units is given in Soil Conservation Service, 1936, table 1.

⁷⁰ Young, 1955, p. 192. Although some Navahos are renting off-reservation grazing lands for their sheep and cattle, this probably does not add greatly to the total carrying capacity of lands available to the Navahos.

⁷¹ This is calculated on the basis of the customary assumption that one horse consumes five times as much forage as one sheep.

⁷² This shift in economic activities may account in part for the rise in the number of horses among the Navaho, since it permits Navahos to enjoy the possession of horses while earning a livelihood in nonagricultural pursuits.

Reservations. The need for such a program was apparent as early as 1941, when the findings of the last Human Dependency Survey became known. Despite the intensive efforts of the 1930's the gross income of the Navaho in 1940 was 30 percent lower than it was in 1936 (table 5). With the rapid increase in the population of the Navaho, this implied an even greater reduction in per capita income. However, the war brought a temporary improvement in the economic condition of the Navaho. By 1944, the total individual (nontribal) income of the Navaho had risen to nearly \$11 million, of which over \$5 million were wage earnings. This represented an increase in wage earnings of nearly 500 percent over 1940. In this same 4-year period, the average Navaho family income rose from about \$335 in 1940 to about \$998 in 1944 (Bureau of Indian Affairs, 1944).

Unfortunately, this wartime prosperity was not supported by any fundamental solution to the economic problems of the Navaho. The end of the war soon brought about a severe economic recession on the reservation, when the wartime markets and employment opportunities were drastically reduced. This crisis motivated a number of new studies leading to the development of an integrated, long-range program of economic rehabilitation. These studies culminated in the Krug Report, which outlined the foundation of the "Navajo-Hopi Long Range Rehabilitation Program" which was enacted by the 81st Congress in 1950 (Bureau of Indian Affairs, 1948; cf. Boyce, 1942).

This enactment authorized an appropriation of \$88,570,000 extending over the decade from 1950 to 1960, and allocated among 14 major categories of expenditure. In table 6, these categories are grouped according to the major objective of the initial authorization and arranged in order of the amount authorized. The amounts already appropriated as of 1956 are also indicated.⁷³

Table 6 reveals four major areas of expenditure that were relatively underemphasized in the programs of the 1930's: education; relocation; economic diversification; and public health. In the field of education, the major objective of the Rehabilitation Program is to bring the reservation school facilities to the point where all eligible children can receive an elementary education. The authorizations for the relocation program seek to encourage permanent emigration from the reservation by providing material assistance to the migrating families during the actual movement and the period of adjustment following their settlement off the reservation. The funds for economic diversification are being utilized to encourage Navahos and Hopis to establish new and varied business enterprises both on and off the reservation. The ultimate aim of the expenditures in these areas is the same: To reduce the strain upon the existing land resources of

⁷³ Young, 1955, p. v. A major part of these yearbooks is devoted to a discussion of the progress made in implementing the provisions of this long-range program.

the reservation and to reduce the dependency of the people upon their traditional livestock and other agricultural means of livelihood. The authorization in the field of health, finally, aims to improve the health conditions of the Navajo and Hopi Reservations so as to reduce the existing gap between health conditions here and those of the country as a whole (see pp. 149-177).

TABLE 6.—*Authorizations and appropriations of the Navaho-Hopi long-range rehabilitation program—1950-56*¹

Category	Authorization as of 1950	Appropriation through June 30, 1956	Remaining authorization
All categories.....	\$88, 570, 000	\$51, 315, 000	\$37, 255, 000
School construction ²	25, 000, 000	24, 200, 000	800, 000
Roads and trails.....	20, 000, 000	8, 405, 000	11, 595, 000
Land improvements.....	³ 19, 000, 000	6, 596, 000	12, 404, 000
Relocation programs.....	⁴ 9, 250, 000	3, 134, 000	6, 116, 000
Economic diversification.....	⁵ 6, 000, 000	2, 028, 000	3, 972, 000
Hospital and health facilities.....	⁶ 4, 750, 000	4, 750, 000	-----
Miscellaneous development.....	4, 570, 000	2, 202, 000	2, 368, 000

¹ Adapted from Young, 1955, p. v.

² The budget approved for fiscal year 1957-58 included a further appropriation of \$5 million to establish a scholarship fund for Navaho students pursuing higher education.

³ This figure comprises \$9 million for irrigation projects and \$10 million for soil and moisture conservation and range improvements.

⁴ This figure comprises \$5,750,000 for resettlement of Navahos on the Colorado River Irrigation Project and \$3,500,000 for general off-reservation placement and relocation.

⁵ This figure comprises \$1 million for the development of industrial and business enterprises and \$5 million for a revolving loan fund.

⁶ This figure comprises \$2,500,000 for agency, institutional, and domestic water supplies; \$820,000 for housing and other necessary facilities and equipment; \$500,000 for common service facilities; \$500,000 for surveys of timber, coal, and other mineral resources; and \$250,000 for telephonic and radio communication systems.

Some indication of the present-day qualifications of Navahos for nonagricultural occupations can be gained from an examination of their occupation distribution. Table 7 compares the occupational distribution of Navahos who applied for employment with the Arizona State Employment Service in the 1950-56 period with that of employed Navahos, 14 years old and over, as reported in the 1950 and 1960 decennial censuses.⁷⁴

The reader should note that these three sets of data are not strictly comparable. The census distributions are derived from the reported activities of Navaho respondents at the time of the 1950 and 1960 censuses, and pertain to activities during the last week in March. On the other hand, the Arizona State Employment Service distributions reflect the classification of Navaho employment applicants over the 1950 to 1956 period, as based upon their education and previous work experience.⁷⁵

⁷⁴ Bureau of the Census, 1953 a, table 21, p. 76; 1963 c, table 56. Arizona State Employment Service, 1956, table 4. The census data were adapted for inclusion with the Employment Service report.

⁷⁵ In view of the very large differences indicated between 1950 and 1960 in the labor force and employment status of the Navaho population, it is necessary to regard all statistical comparisons with caution.

TABLE 7.—*Occupation distribution of employed Navahos, by sex, 1950 and 1960, and of Navaho employment applicants in Arizona—1950-56*

Employment status and major occupation group	1950 census ¹				1960 census ²				Arizona State Employment Service, 1950-56 ³			
	Males		Females		Males		Females		Males		Females	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Population 14 years and over.....	18,150	-----	17,976	-----	23,987	-----	24,906	-----	-----	-----	-----	-----
Total labor force.....	12,990	-----	4,968	-----	11,508	-----	4,731	-----	-----	-----	-----	-----
Civilian labor force.....	12,984	-----	4,965	-----	11,404	-----	4,731	-----	-----	-----	-----	-----
Unemployed.....	840	-----	52	-----	2,332	-----	700	-----	-----	-----	-----	-----
Total employed.....	12,144	100.0	4,913	100.0	9,142	100.0	4,031	100.0	-----	100.0	-----	100.0
White collar workers.....	-----	4.6	-----	3.5	-----	11.5	-----	22.5	-----	2.1	-----	9.0
Professional, managerial, etc.	-----	3.2	-----	1.8	-----	7.2	-----	9.6	-----	0.2	-----	1.5
Clerical, sales, and kindred.....	-----	1.4	-----	1.8	-----	4.3	-----	12.9	-----	1.9	-----	7.5
Blue collar workers.....	-----	31.7	-----	45.6	-----	60.7	-----	12.6	-----	93.4	-----	3.3
Craftsmen and other skilled.....	-----	5.2	-----	0.2	-----	13.5	-----	3.1	-----	8.7	-----	0.3
Operatives and semiskilled.....	-----	10.6	-----	44.9	-----	18.3	-----	5.0	-----	20.9	-----	1.5
Laborers and unskilled.....	-----	15.8	-----	0.5	-----	28.8	-----	4.6	-----	63.8	-----	1.5
Service workers.....	-----	1.2	-----	11.1	-----	5.8	-----	40.5	-----	1.4	-----	79.7
Private household workers.....	-----	0.1	-----	3.6	-----	0.1	-----	8.3	-----	-----	-----	-----
Other service workers.....	-----	1.0	-----	7.5	-----	5.7	-----	32.2	-----	-----	-----	-----
Farmers and farm workers.....	-----	59.8	-----	37.7	-----	13.7	-----	8.9	-----	2.8	-----	7.2
Occupation not reported.....	-----	2.7	-----	2.0	-----	8.4	-----	15.5	-----	0.3	-----	0.8

¹ Bureau of the Census, 1953 a, table 21.² Bureau of the Census, 1963 b, table 56.³ Arizona State Employment Service, 1950, table 4.

Bearing in mind the above qualifications, certain observations can be made. First, the 1950 census reported that about 85 percent of the male Navaho work force was employed in agriculture or in unskilled or semiskilled labor. White-collar and skilled workers comprised only about 10 percent of the employed Navaho male work force at this time. The data from the Arizona employment service for the 1950-56 period reveal a similar distribution—about 10 percent of the male Navaho job applicants were classified as qualified for white-collar or skilled work, while the remainder were classified as semiskilled laborers or unskilled laborers and farm workers.

The 1960 census figures reveal a remarkable improvement in the skill levels of the male Navaho work force, but they also indicate that the skills demanded in the economy have been rising apace. In 1960, about 30 percent of employed Navaho males were working in white-collar occupations, or as skilled workers or as nonprivate household service workers.

Changes in the occupational distribution of employed Navaho women reveal even sharper improvements during the 1950 decade. In 1950, about 90 percent of these women were reported to be engaged in agricultural or service work or semiskilled labor. Similarly, the Arizona employment service classified about 80 percent of the Navaho female job applicants as qualified only for service occupations in the 1950-56 period. It is noteworthy, however, that this employment service classified 7.5 percent of these women applicants as qualified for clerical or sales work, whereas the 1950 census found only 1.8 percent of employed Navaho women engaged in such work in 1950.

According to the 1960 census, 22.5 percent of employed Navaho women were in white-collar occupations, as contrasted with only 3.5 percent so employed in 1950. These changes suggest that Navaho women have been somewhat more successful than Navaho men in upgrading their skills and in finding employment wherein these skills could be utilized.

However, the very large rise in the unemployment rates reported for both sexes between 1950 and 1960, together with the alarming decline in the proportion of Navahos in the labor force during this 10-year period, suggest that the less skilled Navaho adults of both sexes are experiencing even greater difficulty in finding work at the present time. The unemployment rate among Navaho men rose from 6.5 percent in 1950 to 20.5 percent in 1960, while the proportion of all Navaho men 14 years old and over in the labor force declined from 71.5 percent in 1950 to 48.0 percent in 1960. During the same period, the unemployment rate among Navaho women rose from 1.0 percent in 1950 to 14.8 percent in 1960, while the proportion of Navaho women 14 years old and over in the labor force declined from 27.6 percent to 19.0 percent in that time.

Changes of this magnitude clearly demonstrate the worsening plight of the majority of adult Navahos, who still lack the requisite education and training for successful competition in today's economy.

Two final indicators of the relative economic status of Navahos merit brief consideration; reported housing and reported family income. In 1950, the census enumerators reported medians of 3.93 persons per room and 5.0 persons per dwelling unit on the Navajo Reservation. The former figure is the highest found on any Indian reservation, and is over six times higher than the average for the total United States at that time. The latter figure is 61 percent higher than the national average (U.S. Public Health Service, 1955 d). Neither of these figures is an adequate indicator of relative levels of living. Many Navahos still live in hogans, which are almost invariably single-room constructions. Furthermore, they naturally enjoy a far readier access to the outdoors than do urban dwellers, and are in consequence somewhat less restricted to the confines of their housing facilities. Nevertheless, the health implications of having an average of four persons per room are obviously serious.

The median family income of Navaho families in 1949, as reported in the 1950 census, was \$568 in Arizona, \$442 in New Mexico, and \$795 in Utah; the median for the Navajo Reservation as a whole came to \$526.⁷⁶ This figure was lower than that of any other Indian agency in 1949, excepting the Hopi. The overall Navaho figure of \$526 per year was 54 percent of the median family income of all Indians in the United States, and 30 percent of all rural-farm families' median income in this country in 1949.⁷⁷

In 1952, the report of the House Committee on Interior and Insular Affairs provided additional estimates of Navaho family income for that year (U.S. Congress, 1953, p. 110). According to this report, the median earned family income on the Navajo Reservation was \$1,585, of which \$730 was from agricultural activities and the remaining \$855 from other (nonwelfare) sources.⁷⁸ In view of the gradual decline in the purchasing power of the dollar, it is doubtful that these income figures reflect any increase in the real income of the Navaho in the period 1950 to 1952.

⁷⁶ U.S. Public Health Service, n.d. b., tables B, C, and I. This report cautions the reader in regard to the reliability of the figures reported, stressing their dependence upon respondents' memories. A more important source of bias in these data would be the prevalence among Navahos of nonmonetary economic activities and nonmonetary income.

⁷⁷ *Ibid.*, table B, p. 8. It should be noted that the Navaho income reported above is much lower than that given by the Navajo Agency (see table 5). The comparisons quoted above may be warranted, nevertheless, on the assumption that Navaho memories are no more deficient in this respect than those of other Indians or of the rural farm population in general. On the basis of a more recent survey of reservation income, the above 1949 figures have been criticized as being "several times too low." See U.S. Public Health Service, 1957 c, p. 31.

⁷⁸ This figure corresponds closely with the gross income figures reported by the Navajo Agency for 1950 (see table 5, p. 39).

Finally, this report furnished an interesting indicator of the economic position of reservation Navahos relative to non-Indian families residing in the area of the reservation. The prevailing median cash income of these non-Indian families in 1952 was about \$3,200. According to the report, in order for the Navaho families on the reservation to attain that income level by their present means of livelihood, their number would have to be reduced to 29 percent of their estimated number in 1952. In other words, it was estimated that the reservation area could support only 29 percent of the Navaho families on the reservation at the level prevailing among non-Indian families in the area at this time.⁷⁹

Even if the accuracy of these figures is questioned, their gross implications are obvious. Although 54 percent of the average family income of reservation Navahos was derived from nonagricultural sources, their total income, on the average, remained well below that prevailing among non-Indians in the area. This discrepancy is bound to continue until far greater proportions of Navahos can acquire the education and skills necessary to receive better paying or more permanent off-reservation employment.

THE GROWTH OF FORMAL EDUCATION AMONG THE NAVAHO⁸⁰

Prior to the American conquest of the Southwest, the major impact of European culture upon the Navaho was economic rather than social. The Navaho acquired sheep and horses during the Spanish hegemony in the Southwest, but the meager efforts of a few missionaries to convert the Navaho to the ways of Christianity had little perceptible effect. The early efforts of Padre Geronimo Zarate-Salmeron and Frey Alonzo de Benavides, begun early in the 17th century, were not continued. Over a century later, in 1749, small missions were established at Cebolleta and Encinal, only to be abandoned a year later. In the full century of Spanish rule that followed this failure, no further effort to implant Western European values among the Navaho appears to have been undertaken.

Shortly after the transfer of control over the region to the Americans, Capt. Henry L. Dodge was appointed first Indian Agent to handle Navaho affairs. In 1853, Dodge established a training school to teach a few Navahos the arts of iron and silver smithing, employing a Mexican instructor for this purpose. However, with the rapid deterioration in the relations between the United States and the Navaho during the following years, this school was eventually dis-

⁷⁹ U.S. Congress, 1953, p. 110. The data and calculations on which these percentages are based were not included in the final report. However, the more recent survey mentioned in "Health Services for American Indians" estimated that the reservation could support 5,000 of the 14,000 families on the reservation at the present time (U.S. Public Health Service, 1957 c, p. 32).

⁸⁰ The major source of the historical phases of this general subject is Woerner (MS.).

continued. The next plan for the education of the Navaho was ambitious in the extreme. With the transfer of the bulk of the tribe to Fort Sumner in 1864, General Carleton envisioned a program of training and education which would transform these people from "warlike nomads" into "peaceful agriculturalists." His plans were soon abandoned under the harsh realities of crop failures, inadequate facilities, and general mismanagement. Woerner mentions the request of the Rev. P. Equillon for permission to select 15 Navaho boys and girls at Fort Sumner for education at a Catholic school in Santa Fe. If this request was granted, it constituted the only actual educational undertaking of the entire Fort Sumner period.

After the return of the Navaho to their former homeland in 1868, the task of educating and converting them fell to the Presbyterians. The first Navaho school was duly established under the direction of Rev. James M. Roberts, with the assistance of Miss Charity A. Gaston, in 1869. The beginning of this school was inauspicious, to say the least. No facilities were provided for the construction of a school building, so that the opening of the school was delayed over a year until a room could be provided for the purpose. Actual classes began on December 6, 1869, but the school enjoyed no real support from either the Navaho or the authorities.⁸¹ Several Navaho "chiefs" did visit the premises and expressed general approval of the idea, but no responsible parents seemed willing to entrust their own children to this experiment. The school finally closed some 4 months later, having had an irregular attendance averaging only 14 pupils.⁸²

This initial failure was followed by over 30 years of almost complete neglect and inactivity in the field of Navaho education. The original Navaho school was periodically reopened, but with no greater success. The few reluctant children who could be brought into the school were very irregular in their attendance. The strangeness of language and custom which greeted them in the classrooms was undoubtedly overwhelming. The insignificant impact of these early educational efforts is apparent in the attendance records for the period. Average daily attendance remained below 20 pupils until 1882, when the first Navaho boarding school was constructed. With accommodations for 100 pupils, this second school gave promise of greater achievement in the education of Navahos. However, its own average daily attendance

⁸¹ The provisions of the treaty between the United States of America and the Navaho tribe specified that the United States would provide a schoolhouse and a competent teacher "for every 30 children between the ages of [6 and 16 years] who can be induced or compelled to attend school." See Underhill, 1953, pp. 176-181.

⁸² Woerner, MS., p. 23. The annual report for the year 1870 (Doc. No. 124) lists the enrollment at this school as 20 males and 10 females, with 1 teacher. During the Grant administration the several Indian tribes and frontier areas were allocated among the major religious denominations, so that each denomination could pursue its missionary activities in a designated area without interference. In this allocation, the Navaho came under the ministrations of the Presbyterians.

soon dropped from 75 in 1883 to 19 in the following year, and remained below 50 until 1890. (Bureau of Indian Affairs, 1870-90.) With the advantage of hindsight, the basic difficulty can be easily seen. The notion of abandoning one's children to the care of strangers, particularly non-Navaho strangers, was anathema to the Navaho. The European system of formal education simply had no counterpart in Navaho culture. To achieve the active cooperation of the Navaho at this stage, it would have been necessary to first educate the parents, an undertaking clearly beyond the existing facilities of the educators.

Neither the 1892 enactment of the Compulsory Education Law for Indian children nor the development of the Day School System by Commissioner Leupp during that decade had much effect upon the progress of Navaho education. The Navaho acquired the Little Water Day School in 1895, boosting the capacity of all Navaho educational facilities to 130 pupils. The gross inadequacy of these facilities is best shown in noting that at least one-third of the total Navaho population was within the usual "school ages" (from 6 to 18 years of age, inclusive). This means that the total population of school-age children from which these few pupils were selected numbered between 4,000 and 6,000 during the period from 1870 to 1890. Thus only about 2 percent of the Navaho school-age population could be accommodated by the school facilities in existence at this time, while in fact, no more than one Navaho child in a hundred was in attendance at school at any given time throughout this period (see table 9, p. 52).

Mere attendance figures do not reflect either the quality of the instruction offered or the conditions under which it was received. The following quotation gives us some appreciation of these factors. In his report on the condition of the Navaho school in 1894, Inspector J. W. Cadman (MS.) wrote:

[attendance 165.][⁸³] The buildings are not in good repair. . . .

The dining room and kitchen were clean, as were the . . . dormitories.

The food . . . is well cooked and plenty of it, though very little variety.

The teachers here are very good ones, but many of the children speak too low.

The children here are much neglected in many respects—they steal . . . have sore eyes.

The girls . . . are lousy.

. . . their clothing are covered with vermin.

Not a word of English is spoken by the children.

The turn of the century witnessed a new beginning in the education of the Navaho. Existing school facilities were expanded, and three additional schools were opened: at Blue Canyon, St. Michael's Mission, and at Moencopi, a Hopi village. By 1905, average attendance

⁸³ The Report of the Commissioner of Indian Affairs for that year showed an enrollment of 212 and an average attendance during the year of 115 (Bureau of Indian Affairs, 1894, p. 499).

at all schools had risen to over 500 pupils.⁸⁴ By 1911, the number of schools serving the Navaho had risen to 14, with a reported enrollment of 1,086, which exceeded their official capacity by 59 pupils. During this period, noteworthy progress was also made in improving the attendance records of the enrolled pupils. Before 1890, official enrollment figures bore little relation to actual educational progress because of the high rate of absenteeism. However, by 1910, the opposition of Navaho parents to the idea of placing their children in the hands of White teachers had been sufficiently dispelled so that average daily attendance began to approximate the official enrollment.

Meanwhile, the population of the Navaho was also making rapid progress, adding greatly to the number of school-age children eligible to attend school. By 1911, the number of school-age children had risen to an estimated 9,082, of whom 1,086 were enrolled in school. Thus, despite the impressive increases in school facilities, only about 12 percent of the Navaho school-age children could be provided for at this time (Bureau of Indian Affairs, 1911, tables 23-25).

The annual reports of official enrollment for the subsequent years until the Second World War indicate continued gradual improvement in Navaho education, but at no time does enrollment approach the number eligible to attend school. In 1920, with an estimated school-age population of 9,835 (probably a serious underestimate) the official enrollment had risen to 2,484, or just over 25 percent of those eligible to attend school (Bureau of Indian Affairs, 1920, table 18). By 1930, the school-age population came to 11,363, while the enrolled group numbered 5,260, or about 46 percent.⁸⁵ The enrolled population of Navaho children never exceeded half the school-age population until 1950. In 1940, there were 5,756 enrollees out of a school-age population of 12,421 (which was again a serious underestimate of the actual number). Thus the proportion enrolled in 1940 remained the same as in 1930: 46 percent.⁸⁶ Increases in school facilities were therefore barely keeping pace with increased population during this period.

World War II dramatized the seriousness of this educational lag both to the authorities and to the Navaho themselves. As mentioned

⁸⁴ The Blue Canyon School was opened in Western Hopi country, but its enrollment was entirely Navaho (Bureau of Indian Affairs, 1899-1905).

⁸⁵ Bureau of Indian Affairs, 1930, table 3. In addition to the 5,260 enrollees aged 6 to 18 inclusive, this report mentioned for the first time the enrollment of 295 persons aged below 6 or over 18, bringing the total school enrollment of Navahos at all ages to 5,555. Cf. Young, 1955, p. 172, where the number of Navahos in school in 1930 is given as 5,712.

⁸⁶ Bureau of Indian Affairs, 1940, table V. Both the estimated school-age population and the total enrollment appear to have been underestimated in this report. The actual number of Navahos aged 6 to 18 inclusive in 1940 was closer to 16,000, while an additional 1,650 Navahos were enrolled in various non-Navaho service schools. The adjusted figures would still imply an enrollment of close to 46 percent, however. At this time, average attendance varied between 4,100 and 4,500 per month at all Navaho service schools, so that average attendance approximated 75 percent of total enrollment (Bureau of Indian Affairs, 1941 a, pp. 46-52; cf. Young, 1955, p. 172).

earlier, the Selective Service System classified 88 percent of the Navaho males aged 18 to 35 as illiterate (Kluckhohn and Leighton, 1951, p. 91). These findings, coupled with the growing recognition of the importance of education for desirable off-reservation employment, brought renewed interest in education among the Navaho: meanwhile, the enrollment situation appears to have deteriorated during the war. In 1945, only about 6,200 of the 19,200 Navahos estimated in the age group 6 to 18 were enrolled in school, implying a decline in enrollment from 46 to 32 percent. Although much of this decline is spurious, due to duplicate counts of enrolled children and the evident underestimation of the school-age population in 1940, it is nevertheless probable that population increase was advancing faster than school enrollment at this time.⁸⁷

The effects of this inadequate school enrollment can be seen in the statistics on the literacy of the Navaho population. The data presented in table 8 were computed from special tabulations from the 1950 census. They show the percentage of Navahos aged 6 years and older who could read English, and also the percentage who could speak English in 1950.

It is interesting to note that the Navahos residing in New Mexico displayed a considerably higher proportion of literacy than those in Arizona and Utah, evidently reflecting a somewhat greater accessibility of schools in this area and probably a lower degree of general isolation on the part of Navahos residing in New Mexico.

It is also apparent from these figures that the war itself motivated and enabled many Navahos to acquire further formal education. This inference seems warranted by the evident decline in the proportion of illiterates among the 18-44 age group, which would include the

TABLE 8.—*Percentages of Navaho who read and who speak English, by age and State of residence—1950*¹

Age group (in years)	Total Navaho			Arizona			New Mexico			Utah		
	Num- ber	Percentage literate in English		Num- ber	Percentage literate in English		Num- ber	Percentage literate in English		Num- ber	Percentage literate in English	
		Read	Speak		Read	Speak		Read	Speak		Read	Speak
Total, 6 years and over....	43,638	33	35	26,105	28	31	16,408	42	42	1,125	19	23
6-17.....	18,209	36	38	10,912	29	32	6,853	48	48	444	21	22
18-44.....	18,082	38	41	10,589	35	38	6,996	45	46	497	21	28
45 and over....	7,347	14	15	4,604	12	13	2,559	17	18	184	7	14

¹ U.S. Public Health Service, 1957 c, table 7. The percentages shown for the total Navaho were calculated from the figures given for the separate States.

⁸⁷ The figures given for Arizona alone show, in 1945, a population of 10,529 Navahos aged 6 to 18 inclusive, of whom 3,593 were enrolled in school, indicating an enrollment of 34.1 percent (Officer, 1956, p. 31).

approximately 4,000 Navaho males who were found to be 88 percent illiterate in 1942-43. Many of these persons must have acquired additional education during the following 7 or 8 years to permit a decline in illiteracy to 62 percent. This decline can scarcely be attributed entirely to the increased school enrollments of Navaho youth during this interval.⁸⁸

After World War II, the improvement of educational facilities throughout the reservation became a goal of top priority. By 1950, the reported enrollment figures for Navaho school-age children exceeded 50 percent of the total number eligible for schooling for the first time. This expansion was further accelerated after 1950, bringing the total school enrollment to 15,501 in 1954, which amounted to 57 percent of the 27,362 Navaho children aged 6 to 18 at this time (Bureau of Indian Affairs, 1954 b, p. 5). Since 1954, the remaining gap between Navaho educational facilities and those available to the general population of the United States has been narrowed considerably. The reported enrollment for 1955 reached a high of 22,741, or 82 percent of the estimated school-age population.⁸⁹ Since then, an apparent decline has been noted, but this may again be due to shifts in the estimates of the school-age population. The figures on school enrollment for fiscal year 1957 (i.e., for the school year from September 1956 to June 1957) show a total enrollment of 21,339 out of an estimated total school-age population (aged 6 to 18 years, inclusive) of 28,973. This amounts to an enrollment of 74 percent of all Navahos of school age. Table 9 presents selected school enrollment data for the five Navaho subagencies during the 1956-57 school year.⁹⁰

From table 9, certain tentative conclusions can be drawn regarding the present status and future prospects of education among the Navaho. It is evident, in the first place, that significant progress has been made in establishing elementary education on a broad base throughout the reservation. The only serious lag remains in the Tuba City subagency which includes the most farflung and isolated parts of the reservation.⁹¹ Secondly, the proportions of the school-age group who are actually enrolled in school are finally approaching the level prevailing in the general society.

⁸⁸ It should be added that considerable numbers of Navaho servicemen were taught to read and write English as a part of their basic training. This instruction was provided to a number of illiterates in the Armed Forces during World War II.

⁸⁹ Bureau of Indian Affairs, 1955, table 1, p. 6. An additional 938 students under age 6 or over age 18 were also enrolled in 1955, making a total school enrollment of 23,679 Navahos during fiscal year 1955.

⁹⁰ Bureau of Indian Affairs, 1957 a. Copies of these reports were supplied through the courtesy of Dr. Don May of the Navajo Agency staff at Window Rock.

⁹¹ The construction of the dam at Glen Canyon may eventually do as much to reduce the isolation of the Western Navaho region as did the discovery and development of oil and natural gas resources in the Shiprock area to the east.

TABLE 9.—*Selected school enrollment data for the five Navaho subagencies—1956-57*¹

Item	Total reserva- tion	Subagency				
		Shiprock	Crown- point	Fort Defiance	Chinle	Tuba City
Total population aged 6-18.....	28,973	4,952	6,045	7,930	4,455	5,591
Number enrolled in school.....	21,339	3,834	4,800	6,297	3,208	3,200
Percentage enrolled in school.....	73.6	77.4	79.4	79.4	72.0	57.2
Number not enrolled in school.....	6,622	1,118	1,236	721	1,247	2,300
Physically unfit.....	115	14	33	40	-----	28
Mentally unfit.....	23	2	9	9	-----	3
Married.....	135	57	41	14	-----	23
Other reasons.....	470	39	286	134	-----	11
No valid reason.....	1,951	527	598	524	-----	2
Reason unknown.....	3,928	179	269	0	1,247	2,233
Definite information unavailable.....	1,012	-----	9	912	-----	91
Number enrolled in school, aged under 6 or over 18.....	1,419	223	256	478	272	190
Number attending college or university.....	113	30	26	46	5	6

¹ Bureau of Indian Affairs, 1957 a.

A serious lag persists, however, at the higher levels of education. The number of Navahos graduating from high school in 1936 was only 38. It had risen to 139 as of June 1957. Summing the annual number of high school graduates since 1935, we obtain a total of only 1,385 up to and including the 1956 class. In the same 20-year period, the number of Navahos undertaking various kinds of post-high-school education or training rose from 8 in 1936 to 160 in 1956. Finally, as noted in table 9, the number of Navahos attending colleges or universities during fiscal year 1957 stood at 113.⁹²

The extent of the gap implicit in the above figures can be demonstrated in table 10. In this table, the number of high school graduates in a given year is expressed as a percentage of the total population aged 17 years in that year. A recent study by the U.S. Office of Education presents these ratios for the total continental population of the United States, at specified years. Comparable figures for the Navaho can be obtained by estimating the number of Navahos aged 17 for selected years.⁹³

⁹² Bureau of Indian Affairs, 1957 a. Cf. Young, 1955, pp. 175 and 177. On the latter page, Young quotes Dr. May's estimates to the effect that the number of Navaho high school graduates will increase to 500 a year by 1962 and to over 1,800 a year by 1966. If this is realized, the proportion of Navaho high school graduates in 1966 will exceed that in the United States as a whole at the present time. It is interesting to note in this connection that the Navajo Tribal Council has recently included in its annual budget a sum of \$5 million for a scholarship fund for Navahos who seek to pursue higher education (Kelly, 1957, p. 78).

⁹³ U.S. Department of Health, Education, and Welfare, 1957, table 15, p. 27. The number of Navahos aged 17 in 1949-50 and in 1954-55 is estimated from the reported age distribution of Navahos in the 1950 census, assuming an average annual increase of 2.25 percent for the period 1950-54. The number of Navaho high school graduates for these years is from Young, 1955, p. 175. In estimating the number of Navahos aged 17, the number reported in the age group 15-19 was simply divided by 5. This procedure introduces no serious bias, since the required year is at the center of the interval, and mortality is low and fairly constant throughout this interval (Bureau of the Census, 1953 a, table 16, p. 62).

These figures indicate that the Navaho were, in 1954, about 50 years behind the country as a whole as regards the proportions of young adults graduating from high school. It should be noted, however, that this gap may be largely overcome by around 1963, if the increased high school enrollments presently anticipated are realized in fact.⁹⁴

TABLE 10.—*High school graduates as a percentage of persons aged 17 years, at selected periods, United States and Navaho populations compared*¹

Period	Population of continental United States			Population of Navajo Reservation		
	Persons aged 17 years (thousands)	High school graduates (thousands)	Percentage of high school graduates ²	Persons aged 17 years ³	High school graduates	Percentage of graduates
1869-70.....	815	16	2.0	-----	-----	-----
1899-1900.....	1,489	95	6.4	-----	-----	-----
1929-30.....	2,296	667	29.0	-----	-----	-----
1949-50.....	2,034	1,200	59.0	1,404	74	5.3
1953-54.....	2,129	1,276	60.0	1,535	121	7.9

¹ U.S. Department of Health, Education, and Welfare, 1957, table 15.

² The percentage of high school graduates is obtained by dividing the number of high school graduates reported for the given period by the population aged 17 years in the same period, and multiplying the resultant quotient by 100.

³ See Appendix, p. 211, for the procedure whereby this figure was estimated, and the pertinent source.

When we consider the adult Navaho population alone, the gap between their average completed education and that prevailing in the United States as a whole is of course even larger. The establishment of educational facilities for even a majority of Navaho children is far too recent to have had an impact upon the educational levels of the adult population as yet. In table 11, the educational attainment of adult Navahos is compared to that of the total adult population of the United States, as of 1950 and 1960.

The figures on median school years completed suffice to indicate the tremendous gap that prevails as regards the formal education of adult Navahos when compared with that of other adult groups in the United States. In 1950, the median years of school completed by all persons 25 years old and over was about 9.3 years. For non-Whites in the same age group, the median was about 6.8 years. Among Navahos in this age group, it was only about 0.8 years.

It is impossible to gage the improvement that has occurred in the educational attainment of adult Navahos between 1950 and 1960 from published census figures, because the 1960 data pertain to persons 14 years old and over. In the case of the Navahos, whose children have only in recent years been enrolled in school for more than a few years,

⁹⁴ Young, 1955, p. 117. According to these projections, 1,600 Navaho high school graduates are expected for the year 1962-63. As the total number of Navahos aged 17 years cannot be expected to exceed 2,000 by this time, these figures would imply a ratio of about 80 graduates per 100 persons aged 17. As shown in table 10, this ratio was only 60 per 100 for the United States as a whole in 1953-54.

Years of school completed	1960									
	Total United States ³				U.S. non-White ³				Navajo Agency area ⁴	
	Males		Females		Males		Females		Males	
	Number (thousands)	Percent	Number (thousands)	Percent	Number (thousands)	Percent	Number (thousands)	Percent	Number	Percent
Total, 14 and over.....	61,315	100.0	64,961	100.0	6,279	100.0	6,874	100.0	23,997	100.0
Total, 25 and over.....	1,257	2.0	1,183	1.8	334	5.3	254	3.7	7,674	32.0
No school years completed.....	3,593	5.9	2,857	4.4	1,067	17.0	831	12.1	3,876	16.2
1-4.....	8,583	14.0	7,851	12.1	1,408	22.4	1,488	21.6	5,028	21.0
5-7.....	10,894	17.0	10,646	16.4	810	12.9	925	13.5	2,446	10.2
8.....	14,081	23.0	15,443	23.8	1,405	22.4	1,744	25.4	3,235	13.5
9-11.....	13,026	21.2	17,939	27.6	805	12.8	1,113	16.2	3,305	13.8
12.....	5,403	8.8	5,785	8.9	275	4.4	316	4.6	1,309	5.4
13-15.....	4,979	8.1	3,263	5.0	176	2.8	203	3.0	124	0.5
16+.....	10.4	—	10.9	—	8.4	—	8.9	—	5.3	—
Years not reported.....	—	—	—	—	—	—	—	—	—	—
Median years completed.....	—	—	—	—	—	—	—	—	—	—

¹ Bureau of the Census 1953 b, table 9.² Bureau of the Census 1953 a, table 21.³ Bureau of the Census 1963 a, table 173.⁴ Bureau of the Census 1963 b, table 51.

the inclusion in the tabulation of persons 14 to 24 years old undoubtedly raises considerably the median educational attainment of the total adult group. Nevertheless, the educational level of adult Navahos in 1960 was still very far below that of other adult groups in the country. The median years of school completed by persons 14 years old and over in 1960 was about 10.7 years for all persons, 8.7 years for the non-White population, and about 4.5 years for the Navaho population.

A gap of this magnitude cannot be eliminated quickly. Although the 1960 census figures suggest a rapid upgrading in the educational level of younger Navahos, at least another generation will be required before the improved schooling of today's Navaho children can be reflected in the educational attainment of the adult Navaho population as a whole.

Having seen the average educational attainment of the adult Navaho population as a whole, it is instructive to consider the median years of school completed by adult Navahos according to their age groupings and veteran status. The statistics on Navaho employment applicants (gathered by the Arizona State Employment Service in the period 1950 to 1956) permit some analysis of their educational attainment according to these groupings (table 12). It should be stressed at once that these data are not necessarily representative of the Navaho population as a whole. In the first place, the data pertain to Navahos residing in Arizona, thus eliminating the eastern fourth of the reservation area from representation. Secondly, a number of selective factors are clearly operative among the applicants for off-reservation employment. It is obvious, for example, that the educational level of Navaho women who apply for off-reservation employment is well above the average educational level of Navaho women in general at all ages. Other possible selective factors that may operate include serious economic deprivation on the reservation, past experience in off-reservation life, etc. Finally, the median age of the Navaho job applicants is lower than that of adult Navahos as a whole. Omitting the applicants aged under 20 for purposes of comparison, the median age of the remaining applicants (aged 20 and over) comes to 34.1 years for the males and 28.2 for the females. Corresponding median ages for the total Navaho population aged 20 and over in 1950 were 37.0 for the males and 34.9 for the females (Bureau of the Census, 1953 a, table 16; Arizona State Employment Service, 1956, table 7). Hence the job applicants represent a younger group, on the average, than the total adult Navaho population and would therefore, on that score alone, be expected to have a somewhat higher average education.

TABLE 12.—*Median years of school completed by Navaho employment applicants in Arizona, by age and sex—1950-56*¹

Age group (in years)	Number of applicants		Median years of school completed	
	Males	Females	Males	Females
All ages.....	2,705	335	2.3	8.2
Under 20.....	43	54	6.0	7.5
20-29.....	935	171	2.7	8.5
30-34.....	474	29	2.2	7.3
35-39.....	360	37	3.5	8.0
40-44.....	297	19	4.0	9.4
45-49.....	209	9	1.0	(2)
50-54.....	192	10	.8	(2)
55-59.....	88	2	.7	(2)
60-64.....	61	2	.7	(2)
65 and over.....	46	2	.7	(2)
Median ages.....	34.0	26.6	-----	-----

¹ Arizona State Employment Service, 1956, table 7.² Number of applicants too small to warrant computation.

Three tentative conclusions can be drawn from the above data. First, the educational level of the male applicants will approach that of the female applicants in the future, as is suggested by the data on the applicants aged under 20 years in the above table. This group already reflects the effects of the higher rate of school enrollments of recent years. Secondly, it is evident that the female applicants generally are reluctant or unable to seek or find off-reservation employment unless they have received at least a complete grammar school education. This means, further, that the overwhelming majority of the adult Navaho women lack the confidence or skill necessary to successfully pursue such employment. It is also interesting to note that the median education of the women applicants under 35 years of age is somewhat lower than that of the women applicants 35 years of age and older, despite the greater educational opportunities enjoyed by the younger women. This suggests a growing confidence on the part of Navaho women and an increased interest in off-reservation life and opportunity. Finally, the fact that the median years of school completed by the youngest age group of job seekers (combining both sexes), comes to about 6.7 years is a hopeful portent of the increasing skills and education among the Navaho labor force in the future.

There has been considerable speculation concerning the impact of World War II upon the Navaho. Comparative data on the educational attainments of Navaho veterans and nonveterans throw some light on this question. In table 13, the median years of school completed by male Navahos registered for employment at the Arizona State Employment Service during the period 1950 to 1956 are shown, according to age-group and veteran status of the applicants.⁹⁵

⁹⁵ Arizona State Employment Service, 1956, table 9, p. 39. Those aged below 20 and over 44 were omitted because of the small number of veterans in these age groups.

TABLE 13.—*Median years of school completed by adult male Navahos registered for employment in Arizona, by age and veteran status—1950-56*¹

Age group (in years)	Veterans		Nonveterans	
	Number	Median years of school completed	Number	Median years of school completed
20-44.....	455	8.4	1,611	1.0
20-29.....	137	8.7	798	1.5
30-34.....	139	8.2	335	.9
35-39.....	118	8.1	242	.9
40-44.....	61	8.2	236	1.0

¹ Arizona State Employment Service, 1956, table 9.

The most important feature of the above figures is the clear indication that Navaho veterans have greatly improved their educational qualifications during and since their period of active service. Although precise information is lacking, the median educational level of these veterans upon entry into active service could not have been much over 2 or 3 years of formal schooling. This much can be deduced from the fact previously mentioned; that 88 percent of the males aged 18 to 35 were classified by the Selective Service as illiterate, and some 3,600 Navahos did enter active service during the Second World War. These figures imply that many Navahos have availed themselves of opportunities to increase their formal education during and since their period of service.

It is evident, therefore, that the war had a profound effect upon the values and motivations of many Navahos, giving them a valuable insight into the opportunities inherent in the general American society. The above figures suggest, further, that the Navaho veterans possess sufficient education to allow them to play an important role in mediating between the reservation and the outside society, bringing their experience in both worlds to bear on the crucial problems of the present and future. These veterans are undoubtedly providing an important source of community leadership, in view of their experience and training and the high prestige accorded military experience in traditional Navaho culture.

In concluding this survey of the efforts made to establish formal education among the Navaho, a word must be said regarding the educational policies which have informed these efforts. In her study of Navaho education, Woerner (MS., pp. 174 ff.) analyzed these policies into six major phases, covering the century from 1846 to the start of World War II. A brief description of these phases will serve as a convenient summary of the trends indicated in the above discussion.

Phase 1 (1846-68).—Woerner terms this phase the “years of preliminary contact.” It was characterized by a general appreciation of

Navaho wealth and industry, followed by the military conquest of the Navaho and the complete failure of the efforts to transform them into settled agriculturalists at Fort Sumner.

Phase 2 (1869-82).—Termed the “years of neglect,” this period features the readjustment of the Navaho to reservation life under American tutelage. The inadequacy of this tutelage is reflected in the abortive efforts to establish the first school under Presbyterian direction at this time.

Phase 3 (1883-89).—The “years of endeavor” begin with the opening of the first Navaho boarding school, established along the lines suggested by Agent Riordan. These efforts at reform were short-lived, however, owing to the absence of official support.

Phase 4 (1890-1911).—“The years of complex solutions” were characterized by the rapid expansion of school facilities and the enforcement of higher standards in personnel selection. It was during this period, furthermore, that the day school system advanced by Commissioner Leupp was put into operation alongside the boarding school system, in an effort to determine the most suitable educational system under reservation conditions.

Phase 5 (1912-32).—This period is termed “the years of criticism.” As noted earlier, these criticisms culminated in the Meriam Report, which has influenced greatly many of the educational efforts since 1933. The chief feature of the reforms suggested in this report was the systematic effort to make the educational process more meaningful to Navahos on the reservation by relating the curriculums of the schools to the realities of everyday reservation life.⁹⁶

Phase 6 (1933-41).—Woerner terms this phase the “years of experimentation.” The chief accomplishment of this period was the implementation of the major proposals suggested in the Meriam Report. Thus the major objective of the educational policies under the Collier administration was to preserve Navaho culture as a functional entity by relating the classroom curriculums thereto. It was hoped to prepare individual Navahos for a more active role in the general American society without sacrificing their traditional cultural values.

In the light of the impressive developments in Navaho education since 1941, a seventh phase might well be termed the “years of achievement.” This last phase has been characterized by three major factors. First, the war itself greatly facilitated the assimilation of

⁹⁶ The need for an educational program which would recognize and strengthen existing Indian social organizations rather than isolate the individual Indian pupil from these organizations was clearly stated in the Meriam Report (Meriam et al., 1928, p. 346). It was not until 10 years later, however, that detailed proposals concerning necessary modifications in the school curriculum of the Navaho were advanced (Hulsizer, 1940). A summary of Federal Indian policy as it relates to the education of Indians is presented in Officer, 1956, pp. 116-117. More detailed accounts of educational developments and related policies among American Indians are provided in Thompson, 1957, and in Havighurst, 1957. Specifically Navaho educational problems are discussed in both articles.

Navahos into the larger society by permitting a large number of young Navahos to experience the values and opportunities inherent in off-reservation life. Secondly, the rapid growth of educational facilities since the war has provided the majority of Navaho youth with opportunities for education which approach those of general American youth for the first time in history. Also for the first time, the majority of Navaho children are achieving at least minimal literacy in the English language. The third factor is perhaps the most significant, since it has been accompanied by a shift in emphasis in the curriculums toward more intensive preparation for growing participation in the general society (Thompson, 1957, pp. 101 ff.; Havighurst, 1957, p. 113). Although the need to relate the educational process to the life of the typical Navaho child is still recognized, greater emphasis is now being given to the even more pressing need for preparing increasing numbers of Navahos to establish themselves in off-reservation life. This latter objective is dictated by the harsh realities of limited land resources and population growth, which are forcing a growing number of Navahos to seek their livelihood away from the reservation or assume dependency status. The tremendous efforts to bring the Navahos into the schools, especially evident since 1950, reflect the general recognition of the fact that only a minority of Navahos can hope to maintain even minimal living standards through the pursuit of their traditional modes of livelihood on the reservation itself. If the progress of the past few years in the educational field can be maintained, the outlook for a successful solution to this fundamental problem of land resources versus population growth is hopeful.

THE ORGANIZATION OF THE NAVAJO TRIBAL COUNCIL ⁹⁷

Prior to 1923, there existed no official representative group for the Navaho tribe as a whole. Although the chief of an outfit or grazing community could be easily identified at any given time and place, the role of chief was usually held by different persons at different times. A number of outstanding Navaho chiefs did arise from time to time, but their influence was heavily dependent upon the particular chief's personality and the particular situation which produced a need for his leadership. Furthermore, their influence was not derived from the official prerogatives of office, but rather from their personal and demonstrated qualities of leadership. Thus the mantle of leadership could be shifted swiftly and informally from one person to another according to the dictates of circumstance and community feelings (Hill, 1940 b, p. 23). The looseness of this kind of political organization made it difficult to administer Navaho affairs through any centralized agency of government. Therefore, as time went on,

⁹⁷ The following discussion is based primarily upon the account given in Young, 1954, pp. 77-82, duplicated in Young, 1955, pp. 112-119.

a growing need was felt for a more permanent representative group which could serve as a "go-between" in interpreting the policy decisions of the Bureau of Indian Affairs for the members of the tribe at large.

In 1923, the discovery of oil and gas resources near Shiprock clearly indicated the necessity to establish some responsible body which could represent the tribe as a whole in negotiations with the outside interests who were certain to seek permission to exploit these resources. Thus the first council was formed in that year.

The original council was not a truly representative group. Its members were selected arbitrarily by the officials of the Navajo Agency from among the ranks of the more "cooperative" Navahos. This group functioned solely to interpret policy decisions previously arrived at; it possessed no official power to influence these decisions. Furthermore, when the limited functions of this council became generally apparent, many of its members lost much of the influence they had previously enjoyed in their own communities.

The artificiality of this first tribal organization is reflected in the regulations initially adopted for the election of delegates to the council. These regulations provided for the appointment of delegates by the Secretary of the Interior to represent any subagency area which failed to elect such a delegate. Furthermore, the refusal of voting rights to women was particularly unfortunate in the Navaho situation, where women often are as active and influential as men in political and economic affairs.⁹⁸ A final obstacle to the development of a truly functional government was the division of the reservation into five separate agencies at this time. Not until 1934 were these agencies brought under a central Navaho administration at Window Rock. Before that time, each agency was empowered to pursue its own objectives with considerable autonomy, making for frequent confusion and conflict.

In 1936, 2 years after the establishment of a single Navajo Agency, the first efforts were made toward the development of a new tribal council. A committee was appointed to compile a list of some 250 persons of recognized leadership throughout the reservation. From this list, a total of 70 individuals were to be selected so that each land management district (of which there were 18) would have 1 representative for each 400 persons in the district. A constitutional assembly was then created, consisting of the 70 persons selected from the original list of 250. This assembly then supplanted the original tribal council, which was dissolved.⁹⁹

⁹⁸ Young, 1955, pp. 113-114. The regulations were amended to permit Navaho men and women both to vote in 1928.

⁹⁹ *Ibid.*, p. 115. A basis for the popular recognition of local leadership had been instituted with the formation of the chapter system in 1927. These chapters were organized in a number of communities to encourage efforts at local self-government among the Navahos.

With the formation of this assembly, attention was turned to the preparation of rules to guide the election of future tribal councils. After many delays, a set of "Rules for the Navajo Tribal Council" was finally promulgated by the Secretary of the Interior in 1938. These rules provide for the election at 4-year intervals of 74 members of the tribal council plus a chairman and vice-chairman. Each of these members is elected from an election district whose boundaries were drawn so as to include (in 1938) between 400 and 550 persons.¹ Thus, at that time, each council member represented a similar number of persons.

Within the tribal council, provision was made for the formation of an executive committee composed of 18 delegates; 1 from each land management district. This committee could easily be called into session upon short notice if necessary.

Since 1938, three major modifications of the original rules have been made. In 1950, provision was made for the use of pictorial ballots, permitting easier recognition of candidates by persons unable to read. In 1951, the appointment of a standing committee was made the first order of business of each tribal council following its own election. This committee constitutes a permanent advisory committee which, in recent years, has assumed many of the duties formally imposed upon the council as a whole. This committee is sufficiently small to meet continuously if required, whereas the council itself normally meets only four times each year. Finally, the 1938 rules were modified to transfer all responsibility for the conduct of tribal elections from the Bureau of Indian Affairs to the tribe itself. This is a significant step in the gradual transfer of authority from the Bureau to the tribe.

In order to appreciate the vital role to be played by the Navaho tribal organization in the future, a brief digression is necessary. In the previous discussion of trends in Navaho economic and educational development, the underlying Federal policy toward Indians in general has remained largely implicit. A brief survey of the major shifts in this basic policy will, at this point, serve to underline the crucial problems confronting the Navaho tribe at the present time, and will indicate the position of the tribal council in dealing with these problems.²

The earliest policy directives of the Federal authorities concerning Indian affairs in this country sought quite simply to accommodate Indian and White interests by creating separate spheres of influence

¹ The average number of persons now represented by each council delegate would come to about 1,000.

² An excellent summary of the development of the Bureau of Indian Affairs and related Federal policies is included in Young, 1955, pp. 125-141. For a briefer account, see Thompson, 1951, pp. x ff.

for each group. This was to be accomplished by establishing permanent Indian territories west of the Mississippi within whose boundaries the several Indian tribes could pursue their traditional folkways unimpeded by White inroads. The policy of "accommodation by segregation" was initiated during the Jackson administration, when Indian tribes formerly located east of the Mississippi were forcibly relocated in the "open" country west of that river.³

This first policy was doomed to ultimate failure because it did not appreciate the enormous growth potential of the new republic stretched along the Atlantic seaboard. The continued westward expansion of the United States brought no sudden reversal of this policy, but it did render it more and more impracticable. In a long series of "compromises," Indian land holdings west of the Mississippi were progressively reduced until it became impossible for many tribes to sustain themselves without radically altering their traditional modes of livelihood. At the same time, the personal demoralization which generally accompanied the loss of former lands and the continuous encroachment of White settlement tended to further weaken the tribal organization of the Indians most directly affected.

The impossibility of maintaining coexistent Indian and White societies as mutually independent entities on the North American continent was officially recognized as early as 1853. At this time, the dissolution of Indian tribes became an official policy, and the Bureau of Indian Affairs began to settle individual Indians on tracts of land under conditions similar to those of White homesteaders. Under this program, the tribal reservation system was eventually to be eliminated through the gradual absorption of Indians into White society as individuals. It was presumed that this process would occur almost unconsciously, as the Indians assumed the folkways and mores of the Whites among whom they would be settled.

Two fundamental weaknesses doomed this new policy of "assimilation by fiat." In the first place, it overlooked the social and psychological unreadiness of many Indians to adopt the ways of White agriculturalists, forgetting or violating their own customs. In the second place, it ignored or underestimated the social and psychological unreadiness of the Whites to undertake social interaction with Indians, much less accept them into their communities as equals. In view of the previous failure of measures for accommodating these two peoples to one another, the failure of these naive efforts at assimilation is hardly surprising. Successful assimilation would have demanded a far greater degree of mutual understanding and acceptance than was implied in mere accommodation.

³ Young, 1955, p. 128. Young's description of the U.S. Indian Service, on which the present discussion is based, was adapted from Cohen, 1935, chapters 2-4 inclusive, for the period up to 1935.

With the ultimate failure of both their accommodative and assimilative efforts, the Federal authorities were forced to adopt the sole remaining alternative: The Indians became simple wards of the State. Under this new policy, the several Indian tribes were no longer regarded as independent nations, subject to the treaty provisions normally established between sovereign states. Instead, they were reduced to dependency status, to be concentrated in designated areas where their needs would be administered by the Indian agencies established for this purpose. Meanwhile, the allotment system in practice since 1853 was given official recognition in the Dawes Severalty Act of 1879. Under the provisions of this Act, the territories formerly reserved for Indian occupancy were rapidly reduced in size, from 138 million acres in 1871 to 29 million acres in 1933.⁴

The Navaho fell into dependency status under the Federal authorities of Fort Sumner at a highly inopportune moment. The Civil War was in full progress, leaving very few resources for the rehabilitation of newly defeated Indians. The period immediately following the war was certainly no better from the viewpoint of reestablishing a functional social and economic system among the Navaho. In the renewed pressure toward western expansion following the Civil War, all other considerations were swept aside. Increasing numbers of Indians were forced to assume the posture of dependents if they were to survive at all. Thus the policy prevailing during the first 30 years that the Navaho spent on the reservation after the Fort Sumner interlude can be characterized as a policy of "minimal maintenance."

It is remarkable that the Navaho experienced so little of the social deterioration and general apathy which plagued so many Indian tribes at this time. The peculiar location of the Navaho must probably be credited with preserving them from further inroads on the part of White settlers at a time when such encroachments were widespread elsewhere. As noted previously, the reservation was actually increased in size while most Indian lands were being reduced or eliminated entirely. The relative isolation of the Navaho actually produced, in effect, the kind of segregated Indian society which was envisaged in the first policy directives of the early 19th century. However, this segregation could not be maintained indefinitely. By the end of the First World War, the increasing cost of maintaining Indians as wards of the State was creating renewed pressure for the assimilation of all Indians into the general society.

With this renewal of interest in assimilation came intensified efforts at educating the Indians for a fuller participation in the outside society. Once more, the isolation of the Navaho delayed the impact of these efforts for a time, so that significant progress in Navaho educa-

⁴ See footnote 41, p. 24.

tion was not realized until after World War II. Meanwhile the basic policy of the Bureau of Indian Affairs toward Indians underwent a new change in emphasis. With the Collier administration and the Indian Reorganization Act (Act of June 18, 1934; 48 Stat. 984) came a number of programs aimed at resuscitating the several Indian tribal organizations. The ultimate aim of the Collier administration policies was still, in one sense, the absorption of the Indian into the mainstream of American life. However, this policy recognized, first, that each tribe offered a unique set of problems to be solved before assimilation could be successful and, second, that efforts to push assimilation by allowing the traditional Indian society to deteriorate were very costly, since they were inevitably accompanied by a high incidence of personal disorganization—the problem of the “marginal man.” Therefore, the Collier policy sought to encourage assimilation where conditions warranted, while at the same time developing existing tribal organizations as a means for restoring viable economies within the several reservations. In actual practice, this policy tended to grant priority to restorative efforts, allowing assimilation to be delayed. (Haas, 1957.)

Since the end of the Second World War, the general policy underlying the administration of Indian affairs has undergone a further change. Once again, assimilation is being pushed.⁵ This latest change is again no more than a shift in emphasis, but it is highly significant for the future of tribal organization. Under the provisions of the termination program, in effect since 1953, all Federal controls over the administration of Indian affairs are to be withdrawn as rapidly as practicable.⁶ Unlike the allotment system, which withdrew the individual from supervision by removing him from the reservation, the termination program seeks to withdraw Federal supervision from an entire tribe at one time.⁷ Such action places the entire administrative burden upon whatever tribal organization exists in the given case.

Granting that assimilation is ultimately inevitable and even desirable, there remains the question of the degree of preparation necessary to minimize the human and administrative costs of the assimilation process. Premature withdrawal of Federal supervision in any given case would merely result in severe social and personal dis-

⁵ For a summary of the issues underlying this shift in policy, see Dobyns, 1948; cf. Zimmerman, 1957.

⁶ The termination program was announced in the 83d Congress, 1st session, House Concurrent Resolution No. 108, 1953. For a favorable interpretation, see Watkins, 1957; for a critical appraisal, see Zimmerman, 1957, pp. 38 ff., and La Farge, 1957.

⁷ Oliver La Farge, 1957, p. 44. The legislation of the termination program stresses the desirability of initiating termination only at the request of the tribes concerned. However, it does not limit itself to merely awaiting such requests, but envisions the possibility, in some cases, of having to initiate withdrawal proceedings through special legislation without formal request by the tribe concerned. See Watkins, 1957, pp. 54 f.

organization, creating a burden of dependency which State and local authorities would be forced to assume.

The Navaho tribe will eventually be subject to consideration under the provisions of the termination program although, in this case, withdrawal of Federal supervision remains in the indefinite future. Nevertheless, the Navaho tribal organization is already assuming a greater share of responsibility for the direction of tribal affairs. This organization must play a dual role in the future. On the one hand, it must sustain a viable economy within the reservation itself while, at the same time, it must encourage the emigration of an increasing proportion of the reservation population. It is generally agreed that the reservation cannot possibly support more than a minority of the present Navaho population. For the remainder, greater participation in the life of the outside society must be envisioned. The successful pursuit of these two objectives constitutes the major challenge facing the Navaho tribal organization in the immediate future.

SOURCES OF DATA ON THE TOTAL NAVAHO POPULATION

In this chapter, the two major sources of information on the total population of the Navaho—the Bureau of Indian Affairs and the Bureau of the Census—are given detailed consideration. A third source, the Soil Conservation Service, is considered briefly. The purpose of this review is to describe the development of procedures of data collection employed by each of these agencies in obtaining information on the Navaho population. In some instances, the limitations of these procedures are readily apparent from the description given of their salient features. In most cases, however, it is necessary to provide comparative summaries of the pertinent data in order to illustrate particular aspects or defects of the underlying procedures of data collection. The chapter closes with a summary of Navaho population growth as evident from the earliest estimates to those of the present time.

THE BUREAU OF INDIAN AFFAIRS

The Bureau of Indian Affairs was organized in 1824 as a part of the War Department. Its major functions at that time were to carry out treaty negotiations and regulate trade with the growing number of Indian tribes that were coming into contact with American settlers. However, with the disorganization of traditional modes of Indian life that accompanied the progressive encroachment of these settlers upon Indian lands, the Bureau was gradually transformed into a new form of custodial organization. In this capacity, the Bureau was charged with the task of administering Indian affairs in general. The official

policy which informed the administration of Indian affairs was poorly defined. Its aim was to "civilize" the Indian tribes whose former ways of life could not be sustained in the face of the expanding frontiers of American society. In theory, civilizing the Indian meant providing him with a settled agricultural way of life. In practice, it commonly meant reducing him to dependency status.⁸

The custodial role of the Bureau had been clearly established by 1849, when it was transferred from the War Department to the Home Department of the Interior, which was established in that year. The Bureau has remained a part of the Department of the Interior to the present time.

Nearly all of the official reports on the general socioeconomic situation of the several Indian tribes under Federal jurisdiction are contained in the "Annual Reports of the Commissioner of Indian Affairs."⁹ The bulk of these reports consists of accounts submitted to the Commissioner by the Indian agents or superintendents assigned to the several Indian agencies. The population data contained in these accounts are, for the most part, limited to estimates of total population together with figures on school enrollment. These data are usually summarized in a statistical appendix to each annual report. Thus, the ultimate source of the population data submitted for any given Indian tribe by the Bureau of Indian Affairs is the Indian agent or superintendent serving with that tribe.¹⁰

As a source of information on the population of the Navaho, the reports of the Bureau of Indian Affairs can best be considered in five major periods, corresponding to significant developments in the collection of basic data and the maintenance of the pertinent records. The first period, 1848 to 1864, is the interval during which the initial contacts were made between representatives of the U.S. Government and the Navaho tribe. The records of this period contain only incidental and highly fanciful references to the size of the Navaho popu-

⁸ The salient features of the development of Federal-Indian relations, 1775-1953, are presented in U.S. Congress, 1953, chart facing p. 1584. A basic source on the legal aspects of these relations is Cohen, 1935, chapters 2-4. An excellent summary of this work is the adaptation by Young, 1955, pp. 125-141.

⁹ These reports began with the formation of the Office of Commissioner of Indian Affairs under the War Department in 1832. The first significant account of the Navaho Nation is contained in the report of 1849, shortly after the acquisition of the territory of New Mexico by the United States. For bibliographic purposes, all references to the reports are cited as "Bureau of Indian Affairs."

¹⁰ In preparing their annual reports, these officials could and did avail themselves of whatever additional sources of information they found at hand, such as the reports of explorers, missionaries, and traders. A somewhat more reliable source was frequently available in the form of ration lists which were prepared in connection with the distribution of annuity goods and other supplies. After 1890, the figures obtained in the decennial censuses could also be used as a basis for estimates of the population of the several Indian reservations. In some cases, furthermore, the tribal rolls were maintained with sufficient accuracy to provide acceptable population figures from year to year. However, the decision to accept, revise, or ignore any particular population figure usually rested with the reporting agent or superintendent.

lation and its general characteristics. The figures reported at this time were perforce arrived at without benefit of any systematic coverage of or familiarity with the land area occupied by the Navaho.

The second period covers the brief but significant interval of Navaho captivity, 1865 to 1868. At this time, a probable majority of the Navaho tribe was transferred under military escort to a reserved area known as Bosque Redondo or Fort Sumner, some 300 miles from their homeland. At Fort Sumner, periodic and relatively accurate enumerations of the Indians were carried out by the military officials in charge.

The third period, 1869 to 1885, encompasses the gradual resettlement of the Navaho upon their former lands, and their recovery from the dislocation engendered by their military defeat. An important feature of this period is the gradual scattering of the Navaho over their former land area. This meant that the population estimates of this time, derived from enumerations carried out at the agency headquarters at Fort Defiance, are progressively inadequate as indicators of the size of the Navaho population as a whole.

The fourth period, 1886 to 1909, is marked by the development of the first Navaho tribal rolls. These were designed to provide the administrative officials with a listing of all Navahos whose usual residence was in the area under their jurisdiction. In practice, however, the initial listings were neither complete nor accurate; no satisfactory definition of "usual residence" could be applied under the conditions prevailing in Navaho country, and an increasing number of Navahos did not fall under any of the jurisdictions of the reservation-proper. The resultant population estimates therefore varied widely from the totals appearing on the several rolls.

The fifth and final period, 1910 to the present, is characterized by the development of improved procedures for collecting and recording statistical data on the population of the Navaho, culminating in the preparation of the most recent tribal rolls in 1928-29. The 1929 rolls, revised continuously to incorporate reported births, deaths, and changes in family composition, still constitute an important source of information on the Navaho population and are used by the Navaho administration at the present time.

PERIOD 1. 1848-64

Throughout the pre-Summer period, the Navaho Nation was the object of considerable interest and speculation on the part of the civil and military authorities of the newly incorporated Territory of New Mexico.¹¹ This interest was due partly to the growing impact of

¹¹ This area was ceded to the United States by the Government of Mexico in 1848 and was proclaimed the Territory of New Mexico on December 13, 1850. The boundaries of this territory corresponded approximately with the present boundaries of the States of Arizona and New Mexico. See Bureau of the Census, 1872, vol. 1, p. 578.

Navaho and other Indian raiding expeditions against the American settlers in the area, and partly to the natural desire of the American officials to increase their familiarity with the largely unknown lands that had so recently fallen under United States sovereignty.¹²

The records of this period, and in particular the references to the population of the Navaho, reflect the absence of any systematic coverage of Navaho country. The several military reconnaissances that extended into Navaho country at this time provided little more than impressionistic glimpses of Navaho life and customs. The population estimates that accompanied the reports of these expeditions were crude approximations at best. Perhaps the most carefully composed of these reports is that of James H. Simpson, who summarized his impressions of the population of the Navaho as follows:¹³

In respect to the population of the Navaho Nation, it has been impossible for me to arrive at anything like an approximation of it. Indeed, if the few we have seen bear a proper proportion to the whole number contained in the country, the extent of this population has been greatly exaggerated. But I prefer to believe that, as a nation, they live much scattered, and that those through whose precincts we have passed have studiously avoided us. All things considered, then, I would estimate the population from 8,000 to 10,000 souls: this last number is Gregg's estimate.

It is evident from the above account that the population estimates of this period, derived from sporadic contacts made during expeditions that were carried out in an atmosphere of growing hostility, are little more than reasoned guesses. As the following quotations reveal, the subjectivity of these early population estimates is reflected in the fact that the figures given tend to increase with the increase in hostilities between the Navaho and the American settlers and military.

In the first of the official annual reports containing information on the Navaho tribe, James S. Calhoun (1850, p. 63), Indian Agent at Santa Fe, N. Mex., estimated the Navaho population at 5,000 persons. Five years later, in 1854, D. Merriwether, the Governor and Superintendent of Indian Affairs in the Territory of New Mexico, expressed the opinion that the Navaho probably numbered 8,000.¹⁴ In the year

¹² Although a few Americans, notably Kit Carson, were familiar with much of the country inhabited by the Navaho, the bulk of the earlier Spanish explorations and the more recent westward movement of the wagon trains passed either to the north or south of Navaho country.

¹³ Simpson, 1852, p. 79. The reference to "Gregg's estimate" pertains to Gregg, 1855, pp. 285 ff.

¹⁴ Merriwether, 1855. Merriwether's laudatory account of the Navaho tribe merits quotation:

"The Navajoes . . . probably number eight thousand souls, and occupy and claim a country equal to 25,000 square miles. . . . The Navajo country is represented to be one of the finest agricultural regions within New Mexico; and they certainly are very far in advance of any other wild tribe of Indians of this Territory in agriculture and manufactures. . . . [They] raise an abundance of corn and wheat. . . . [And] have numerous herds of horses and sheep, and some horned cattle and mules, and, on the whole, live in a degree of comfort and plenty unknown to the other wild Indians of this section of the Union."

following, Governor Merriwether revised his earlier estimate downward, reporting as follows: ¹⁵

A more intimate knowledge of the Indians of this territory induces me to correct the estimate of their numbers, contained in my last annual report; . . .

The Navajoes I would estimate at 1,500 warriors and 7,500 souls.

The few remaining estimates of Navaho population made in this period are chiefly noteworthy as reflections of the growing concern and respect of the American authorities for the warrior strength of the Navaho. The annual report of 1857 gave their number as between nine and twelve thousand, including two to three thousand warriors. By 1859, the estimate of their population had risen to twelve to fifteen thousand (Collins, 1858; Baker, 1860).

The last report of this period was submitted in 1861 by the then Superintendent of Indian Affairs of the Territory of New Mexico, J. L. Collins. Although it contained no population figures, this report is noteworthy for its reference to the serious impact of the growing hostility between the Navaho and the American and other settlers in the area, together with the more traditional enemies of the Navaho. The Navaho, according to Collins, suffered severe losses of life and property, and still more in the loss of women and children made captives at this time.¹⁶ In a separate document (No. 88) contained in the annual report of 1861, the Navaho population was estimated at 9,000, which would indeed represent a drastic decline from the totals given for 1857 and 1859, as quoted above. However, it must be emphasized that the very speculative nature of all the above estimates does not warrant any specific conclusions in regard to the actual trend of the Navaho population at this time.

The question of the number of Navahos taken captive by Mexicans and others during this period is significant for its bearing on estimates of the total Navaho population immediately following the Sumner captivity. The largest estimate of the number of such captives is that of Dr. Louis Kennon, who expressed the opinion that five or six thousand Navahos were held in slavery both by American and Mexican settlers in the area at that time. Writing in 1865, Kennon (Young, 1957, p. 217) reported:

¹⁵ Merriwether, 1856. Although Merriwether's estimate is about 50 percent above Calhoun's, they were agreed with respect to the area occupied by the Navaho at that time. Calhoun reported that the Navaho claimed the territory from about latitude 35-38° N. and from longitude 29-33° W. (west of Washington, D.C.). This area would correspond in size to the 25,000 square miles reported by Merriwether.

¹⁶ Collins, 1862, p. 124. The particular conflict referred to in this report occurred in 1860, when a punitive expedition composed of regular U.S. soldiers, Mexican volunteers, and Pueblo and Utah Indians invaded Navaho country under the command of Colonel Canby. Many of the volunteers in this group appear to have been motivated as much by prospects of plunder as by a desire for revenge. The report of 1866 refers to the common practice among these volunteers of retaining captive Navaho women and children as slaves, to be sold to private individuals away from the Navaho area. Graves (1867) requested the intervention of Congress to put a stop to this practice.

I know of no family that can raise one hundred and fifty dollars but what purchases a Navajo slave, and many families own four or five . . . I have been conversant with the institution of slavery in Georgia, but the system is worse here, there being no obligation to care for the slave when he becomes old or worthless.

It is apparent that the institution of slavery as it developed in the Southwest permitted a considerable degree of assimilation between the captives and their owners. Chief Justice Kirby Benedict, also writing in 1865, referred to the common practice in this area of regarding the offspring of captive Navaho women as citizens, “. . . who then marry and blend with the general population.”¹⁷ With respect to the actual number of Navahos who may have been captured and sold into slavery during this period, it is impossible to fix upon a precise figure. The number given by Kennon may well have been colored by the emotions that were aroused by all references to slavery at the time, and if the number of slaves was as high as the figure he reported, we could expect far more references to this institution than are extant.

The imprecision of the population estimates quoted above is readily apparent without detailed analysis. Starting with a figure of 5,000 in 1849, these estimates rise to a high of 12,000 to 15,000 in 1859, and then, 2 years later, decline sharply to 9,000. Subsequent population figures for the Navaho tend to suggest that the 1849 figure was far too low, but they do not clearly indicate which of the higher figures is the more correct.

In considering the procedures whereby these population figures were reached, it is necessary to review briefly the general situation prevailing in this area at this time. The entire area from the Rio Grande River to the Colorado had just been ceded by the Government of Mexico, and was in a process of transition from military to civil administration. Neither the military nor the civil authorities had yet acquired any systematic knowledge of the territory as a whole, or of its inhabitants. Most of the Indians in this territory, except the Pueblo, had neither been pacified nor defeated by the American military forces. The entire period was marked by growing hostility between the several Indian tribes and the American settlers, and the Navaho figured prominently in these hostilities. Military reconnaissance which penetrated into Navaho country did not cover the vast area systematically,

¹⁷ Young, 1957, p. 217. Justice Benedict's testimony is included in U.S. Congress, 1867, Appendix.

Navaho slaves appear to have developed a distinctive blanket design (Mera, 1938). Mera mentions that numerous Apache slaves were captured by Spanish expeditions as late as 1860. Some of these captives were undoubtedly Navahos.

and the population estimates derived from these expeditions are therefore of dubious merit.¹⁸

Under these circumstances, it is not surprising that the reporting agents could not arrive at consistent or reliable estimates of the Navaho population before the Fort Sumner period. In addition to their manifold regular duties, each official was charged with the responsibility of submitting an annual report on the general condition of each of the Indian tribes under his jurisdiction. In order to prepare these reports, it is evident that the more vigorous or conscientious of these officials did attempt to familiarize themselves with the land and the people under their jurisdiction. However, except for the Eastern Pueblos, the Indian tribes concerned could not even be surveyed, much less enumerated, at this time. At best, the figures submitted by these officials can only be regarded as indicating plausible upper and lower limits for the population of the Navaho. Within these limits, the actual population of the Navaho at this time must remain a matter of conjecture.

PERIOD 2. 1865-68

The population data of the second period offers a sharp contrast with that of the first period. The population reports now assume the nature of tallies or head counts of a captive population, carried out under circumstances which would seem to insure accuracy. However, the apparent transition from crude population estimates to accurate enumerations is more apparent than real. It is true that the enumerations carried out at Fort Sumner were accurate and their coverage fairly complete. But any realistic estimate of the total Navaho population at this time requires consideration of far less reliable estimates of the number of Navahos who were never brought to Fort Sumner, together with the number of Navahos who had previously been captured and enslaved by the settlers in the area.

The first report for this period is that of Brig. Gen. J. H. Carleton, who was in command of the military forces at Fort Sumner and elsewhere in New Mexico. The report was dated April 24, 1864, about 1 month after the arrival of the first caravan of captive Navahos from Fort Defiance. In this report, Carleton stated that about 6,000 Navahos had already arrived at Fort Sumner, and estimated that not over 2,000 "Ricos" (wealthier Navahos) had not yet surrendered at this time. These figures would seem to imply a total population of about 8,000.¹⁹

¹⁸ The only known "hogan-to-hogan" survey ever conducted in Navaho country up to this time was conducted about 70 years prior to the American conquest of the area. At that time, Fathers Dominguez and Escalante completed a mapping expedition of Navaho country, reporting 700 families and 3,500 souls, located in five "cantons." As quoted in Van Valkenburg and McPhee, 1938, p. 5. The reference may be to the Hopi pueblo villages.

¹⁹ As quoted in Young, 1957, p. 219. The first of these caravans, consisting of 2,400 Navahos, left Fort Defiance on Mar. 6, 1864. The 300-mile journey to Fort Sumner took about 20 days. According to Underhill (1956, p. 124), two additional parties of Navahos,

One source of later disagreements as to the population of the Navaho in this period can be found in this first of Carleton's reports, wherein Carleton quotes Col. Christopher (Kit) Carson to the effect that less than half of the Navaho had been rounded up at this time. Carleton himself expressed disagreement with Carson on this point. If Carson, whose familiarity with Navaho country was unexcelled, was correct in his estimate, the actual Navaho population may well have exceeded 12,000 in 1864.²⁰

Four months later, General Carleton submitted a more detailed report on the Navahos at Fort Sumner, stating that 5,911 Navahos had arrived at the fort, and an additional 1,309 were en route thereto. In the letter accompanying this report, Carleton further reduced his estimate of the number of Navahos remaining outside of captivity, stating that he did not believe that as many as 1,000 Navahos were left in their country.²¹

A second and more detailed enumeration of the Navahos at Fort Sumner was made on December 31, 1864, by Capt. Francis McCabe.²² The results of this census are shown in table 14. It is apparent that the population of Navahos at the fort had reached a peak at this time. The figures reported just 4 months later reflect a drastic decline in numbers. On April 30, 1865, an enumeration of Navahos at the fort arrived at a total of 7,169. The number of Navahos that had arrived at the fort during the previous year was given in this report as 8,474.

TABLE 14.—*Reported population of Navahos at the Bosque Redondo (Fort Sumner), N. Mex., by age and sex—Dec. 31, 1864*¹

Age group ²	Total		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
All ages.....	8,354	100.0	4,088	48.9	4,266	51.1
Infants.....	422	5.0	134	1.6	288	3.4
5-18.....	2,943	35.2	1,525	18.2	1,418	17.0
18-50.....	4,316	51.7	2,129	25.5	2,187	26.2
50-80.....	673	8.1	300	3.6	373	4.5

¹ Keleher, 1952, p. 502. These data are also shown in Young, 1957, p. 279. The actual count was taken by Capt. Francis McCabe, and was originally reported in U.S. Congress, 1867.

² As given in the original report.

numbering 700 and 1,200, respectively, departed for Fort Sumner during the month following. This would make a total of about 4,300 Navahos actually at or en route to Fort Sumner at the time of Carleton's first report. Smaller parties of Navahos proceeding to the fort at other times, together with the Apache bands also at the fort, might account for the discrepancy between the smaller figure and Carleton's estimate of 6,000.

²⁰ In referring to this period, Young (1957, p. 219) estimates the Navaho population as between 9,000 and 12,000.

²¹ Carleton, MS. A chart showing the population of Indians at or en route to Fort Sumner was enclosed with the letter. Carleton's extreme optimism regarding his ability to assemble and transform the Navaho tribe in its entirety into a settled agrarian population is apparent in these figures.

²² The results of this enumeration are summarized in Keleher, 1952, p. 502, and Young, 1957, p. 279.

The difference between these figures was attributed to "deaths, not reported, and the absence of those who are hunting or herding their stock."²³

The population of the fort appears to have remained fairly constant during the remainder of the year, since the report of Felipe Delgado, Superintendent of Indian Affairs at Santa Fe, reported that the Navahos at Bosque Redondo (Fort Sumner) numbered 7,151 in September 1865.²⁴ However, further declines in their number are indicated in the figures for the year following. The annual report of 1866 gave their number as 6,447, and included mention of an estimated 1,200 Navahos who were "still at large and hostile." In this report, J. K. Graves placed the population of the Navaho in 1846 at 13,500, and attributed their subsequent decline in numbers to the combined effects of continuous warfare and the practice of capturing and enslaving Navaho women and children (Graves, 1867).

In September 1866, M. Hillary, assistant surgeon of the U.S. Army stationed at Fort Sumner, submitted an interesting report on the health of the Navahos at the fort. He reported:²⁵

On this reservation I cannot say I have seen a single case of constitutional syphilis. But what does and will decrease the number of the tribe and finally wipe them out of existence is the extensive system of abortion carried on by the young women. You may remark how seldom it is a young woman has a child; in fact, none of the women, except they are thirty or forty, ever think of having one, if they can help it, so that two or three children are considered a large family.

By the spring of 1867, conditions at the fort had deteriorated to the point that even the enumerations that were carried out were subject to considerable inaccuracy. Many Navahos were leaving the confines of the Fort Sumner area in forays against Comanches and others in the vicinity. The failure of two successive crops, together with the inadequacy of supplies and the glaring inefficiency of their distribution had produced a general demoralization. The deterioration which occurred at this time is reflected in the figures reported in that year.

²³ Young, 1957, p. 219. The report quoted is from the deposition of H. B. Bristol, Captain, 5th U.S. Infantry, stationed at Fort Sumner. Captain Bristol served as military superintendent of the Navahos at the fort. In his deposition, he stated that the total population of Navaho arrivals was composed of 2,325 men, 2,710 women, 3,164 children, and 275 infants at the breast, or 8,474 in all. He further reported the number of "unknown" deaths among this group as 216 from the time of their arrival until the date of his report, June 27, 1865. This leaves a discrepancy of over 1,000 Navahos. It can safely be presumed that some of these persons were in fact wandering away from the fort in search of food or fuel, while others were among the number of "deaths not reported to the authorities."

²⁴ Delgado, 1865, p. 161. Although this figure is only 69 less than the number of Navahos at or en route to Fort Sumner a year earlier, the actual mortality at the fort may have been much higher, since additional numbers of Navahos continued to arrive at the fort in the interim.

²⁵ Hillary, 1867. The Navahos might indeed have died off, had they been forced to remain at the fort much longer. To the profound shock of social disorganization and removal from accustomed surroundings was added the debilitating effects of inadequate provisions and crop failures. See the excellent account in Underhill, 1956, pp. 127-140.

In an enumeration conducted on May 31, 1867, in connection with the distribution of ration tickets, a total of 7,406 Navahos were counted. One month later, a Lieutenant MacDonald carried out a second enumeration, and counted 2,150 men over 18; 2,530 women over 18; and 2,620 children "under 18," for a total of 7,300. The reporting agent concluded that there were, in all, about 7,500 Navahos at Fort Sumner during 1867, including those temporarily absent.²⁶

In evaluating the sources quoted above, it is necessary to distinguish between the actual enumerations conducted at the fort and the conflicting estimates of the number of Navahos who were never brought to the fort in the first place. Probably the most reliable figure in this period is the count of all Navahos who arrived at the fort during the first year of its establishment as a Navaho reservation. Upon their arrival, all Navaho groups were counted, and this record was maintained by the military authorities at the fort.

The separate enumerations that were made of Navahos already at the fort are also relatively reliable, although certain factors may have tended to produce an overcount. The typical procedure in taking these enumerations was the essence of military efficiency. Most of the enumerations were conducted in connection with the distribution of ration tickets. In order to receive his ration ticket, each Navaho was made to walk through a single gate into an enclosed area within the fort grounds known as the "Navaho corral." As he passed through the gate, each Navaho received a ration ticket for himself, plus additional tickets for any member of his household who was unable to present himself because of illness or duties elsewhere.

In order to prevent duplications, no Navaho was permitted to leave the enclosure until all had entered. An actual count was made of all Navahos as they entered the corral, but the totals reported included an allowance for the small number who were reported as absent for various reasons.²⁷

Although this straightforward procedure would appear to guarantee a highly accurate count of the population, there is some evidence to the contrary. The Navahos soon demonstrated considerable ingenuity in improving their lot, both by claims of fictitious dependents and by forging ration tickets. While neither of these practices could affect the basic count of persons entering the corral, they may have produced exaggerated estimates of the total number of Navahos at the fort at any given time (Underhill, 1956, p. 136).

²⁶ Dodd, 1868. These figures indicate a decline of 175 men, 180 women, and 819 children in the period 1865 to 1867. The latter decline is particularly striking in view of the probability that except for a few shepherds, most of the Navahos away from the fort at any given time would be adults.

²⁷ This enumeration procedure is similar to the "recensements d'assemblage" as carried out in some parts of Africa, wherein the villagers are ordered to assemble in a designated area at a specified time in order to be counted by the officials.

The estimates of the number of Navahos who were never brought to the fort remain highly contradictory. As mentioned previously, General Carleton's final estimate placed their number as under 1,000, while Colonel Carson's implicit estimate was closer to 6,000. In addition to this glaring discrepancy, there remains the question of the number of Navahos who had been captured and enslaved prior to the Sumner period. Of the two specific references to this latter group, the first estimate, mentioned above, gave their number as 5,000 or 6,000, while the second implies a figure of under 1,000.²³

It is evident from the above data that the sources available for this second period do not provide a reliable estimate of the Navaho population as a whole, although they do furnish relatively precise information on the number of Navahos actually brought to Fort Sumner. The available estimates of the number of Navahos who never arrived at the fort would appear to range from a minimum of 2,000 to a maximum of perhaps 6,000 or 8,000, but the exact figure must again remain a matter of conjecture.

With respect to information on the characteristics of the Navaho population at the fort, the enumerations of the military authorities are seriously defective. In the first place, the reported totals fail to specify the allowance made for persons "temporarily absent" from the fort. Secondly, it is evident that no adequate record of births and deaths occurring at the fort was maintained. Finally, when these reports included references to age and sex categories, the classifications as reported are either overlapping or nonexhaustive.²⁹

In summary, it can be concluded that even under conditions of captivity, the Navaho population was not satisfactorily enumerated by the authorities in charge.

PERIOD 3. 1869-85

The third period in the development of the population records begins with the return of the Navaho to their former lands during the latter half of 1868.³⁰ During the first 2 or 3 years of this period, the Navahos

²³ The higher estimate is that of Dr. Louis Kennon (Young, 1957, p. 217). The lower figure is from the annual report of the Navaho agent for the year 1872 (Keams, 1872). It is, of course, possible that Dr. Kennon's estimate of the "slave" population of this area included considerable numbers of non-Navaho Indians and Mexicans living under a system of peonage. In this 1872 report, the Navaho population was said to have increased over the previous year by 880. This increase was mainly attributed to the "return of captives by the Mexicans." However, no specific figures were given as to the number of such captives returning that year or during the years immediately preceding or following.

²⁹ For example, Lieutenant MacDonald's enumeration (Dodd, 1868), gave the number of men and women over 18 and the number of children under 18. Later reports sometimes reported the number of men over 18, the number of women over 16, and the number of children under 16.

³⁰ The last formal action taken at Fort Sumner was the signing of a treaty of peace between the Government of the United States and 18 Navahos who had been acknowledged as chieftains of their people. The treaty was signed on June 1, 1868, whereupon the Navahos proceeded to their former homelands. Many Navahos had already departed from Fort Sumner by that time. See Underhill, 1953, pp. 176 ff.

at Fort Defiance were enumerated by methods closely similar to those employed at Fort Sumner. The destitute condition of nearly all of the returnees forced the military authorities at Fort Defiance to continue the rationing system that had been employed at Fort Sumner. By the same token, it can safely be presumed that the vast majority of returning Navahos were forced, at least initially, to remain in the vicinity of Fort Defiance so as to be able to proceed to that point periodically for their essential rations and other supplies.

Under these circumstances, it is probable that the enumerations which took place in connection with the issuance of rations and other supplies were as complete as any of those occurring at Fort Sumner. The specific dates on which supplies were to be issued were widely announced in advance, permitting all but the most widely scattered Navaho groups to congregate at Fort Defiance. In addition to food, over 30,000 head of sheep and goats and small amounts of farm implements and other tools were issued to the Navahos at this time. It is unlikely that many Navahos failed to avail themselves of the opportunities afforded by these periodic distributions.

The first official report after the departure of the Navahos from Fort Sumner has their number as "about 8,000 . . . including several hundred that were never captured and placed at Fort Sumner."³¹ This supports the view that some, at least, of the uncaptured Navahos were also motivated to make their appearance at Fort Defiance to receive a share of the available supplies.

The enumeration which was carried out in 1869 confirmed the above estimate of the size of the total Navaho population at this time. In his report of this enumeration which he had personally conducted, Captain Bennett (1870, p. 237) stated:

My first count, on October 2, was 6,954; my second count, on October 18, was 1,227; making a total of 8,181, as follows: 2,474 men, 2,965 women, 2,742 children. It was a very full count [it being announced that annuity goods would be distributed on October 2], Indians coming here from all parts, some 250 from Cibaletta [Cebolla], and 200 from Cubero, and some from Mesa Calabasa . . . I am of the opinion that . . . a few drew twice, but they were all vouched for by the 12 principal chiefs.

Despite Bennett's claim regarding the completeness of his 1869 count, the report of the following year again suggests the inherent limitations of any attempt to enumerate an entire population by assembling that population at any single location. In the 1870 report,

³¹ Davis, 1869. The number of Navahos still at Fort Sumner at the signing of the peace treaty may not have exceeded 7,000, since they had been leaving the fort in increasing numbers throughout the last year of their exile. In addition, some Navaho groups did not complete the return journey to their former lands, but instead settled at a number of localities along the way; notably at Ramah, Cabolleta (Cebolla), and Cubero. Thus, the estimate of 8,000 Navahos returned to their former reservation would appear to include much more than the "several hundred" who were reported to have avoided capture. (See Underhill, 1956, p. 147.)

7,790 Navahos were reported to be residing on the reservation assigned to them (immediately surrounding Fort Defiance), but an additional 2,000 were said to be "roaming with other tribes." This would imply a total Navaho population of about 10,000.³²

This crude estimate of the number of Navahos living away from the confines of the reservation assigned to them is particularly significant in explaining the sudden increases that subsequently occurred from time to time in the reported estimates of the total Navaho population. The reports for 1871, 1872, 1873, and 1874 all mention the existence of some Navahos off the reservation, but no estimate of their number is included in the totals given. The report for 1875, on the other hand, represented an increase of 2,700 over the report of the previous year, without making any explicit reference to Navahos residing off their reservation. It is likely that this increase represents the reporting agent's estimate of the off-reservation population, which he merely added to the estimated number of reservation Navahos as given in the report of the previous year. A similar adjustment appears to have been made at the discretion of the reporting officials in later years as well.

The actual figures given for the years 1871 to 1875 provide but a single clue to the possible number of Navahos captured by Mexicans and other settlers prior to the Fort Sumner period. The report of 1872 mentions an increase of 880 persons over the count of the previous year, and attributes most of this increase to the return of captives by the Mexicans. It can probably be safely inferred that additional hundreds of Navahos were gradually making their way back to their former lands throughout the period immediately following the Fort Sumner episode. Still other Navahos appear to have established themselves in a number of areas outside even the present confines of the reservation, while a few may well have lost their identity as Navahos and merged with the Mexican or Pueblo population.³³

Further examination of the reports for these years reveals something of the casual and arbitrary procedures employed in reporting the population of the Navaho. In 1872, Thomas V. Keams, Special Agent for the Navaho, carried out a count of the population under his jurisdiction. He apparently followed the procedures employed by the military authorities, completing his count in connection with a distribution of ration tickets at Fort Defiance. Keams arrived at a total of 3,300 women, 2,912 men, and 2,902 children; 9,114 persons in all. The reporting agent in the following year, J. D. Gould, merely

³² Bureau of Indian Affairs, 1871, Doc. No. 124. The figure of 7,790 is quoted as being from the report of 1869, as is the estimate of 2,000 Navahos living off the reservation at this time. The discrepancy between this total and that of 8,181 is not explained.

³³ See footnote 28, p. 76. Cf. Gould, 1874, p. 271. Gould reported the latest count of Navahos on the reservation as 9,114, but went on to state that there were a number of Indians off the reservation; some under a subchief, Ague Grande, living at the foot of Mesa Calabasa, others near Cubero and Cebolleta (Cebolla).

repeated Keams' figures, but added the specification that the children reported were "under 16." This quantification merely reflects the natural desire of the reporting official to lend some appearance of precision to the figures reported.

Another example of the arbitrary adjustments made with the figures that were reported at this time is evident in the reports of 1875 and 1877. In 1875, the Navaho population was reported as 5,802 males and 5,966 females, for a total of 11,768. The corresponding figures reported in 1877 are 5,852 males and 6,016 females, for a total of 11,868 (Bureau of Indian Affairs, 1875, p. 114; 1877, p. 298). It is evident that the reporting agent added, with perfect impartiality, the number 50 to the totals reported for each sex in 1875, giving a total increase of precisely 100 persons during the 2-year interval.

The reports of 1878 to 1880 are repetitions, with minor adjustments, of the figures given in 1877; the totals for these 3 years are 11,850, 11,850, and 12,000, respectively.³⁴ However, the reporting agent in 1881 apparently decided that the figures quoted above were far too low. Accordingly, he arbitrarily increased the figure given for 1880 by one-third, reporting a total Navaho population of 16,000. This figure was again reported in 1882. But in 1883, a new agent came into the picture, and he promptly added another 1,000 to the figure inherited from his predecessor, reporting a total population of 17,000 in 1883, and a more modest increase to 17,200 in 1884.³⁵

The report of 1884 is noteworthy for its inclusion of the first estimates of Navaho vital rates. In this report, 600 births and 400 deaths were reported as having occurred among the Navaho during the previous year. The difference between these numbers accounts for the increase of 200 reported over the report of 1883.

The impact of these sudden and arbitrary modifications in the reported Navaho population figures can readily be seen by means of the following simple computations: Dividing the reported 1884 population of 17,200 by that reported in 1877 (11,868) produces an increase of 45 percent. The average annual rate of increase implied by these figures is about 5.4 percent. By contrast, if we divide the reported births and deaths in 1883 by the population given in that year, we obtain a crude birth rate of about 35 and a crude death rate of about 23, giving a crude rate of natural increase of about 1.2 percent per year.³⁶ Thus, the rate of increase implied in the totals given in this

³⁴ Irvine, 1878, 1879, and 1880. Agent Irvine merely repeated the last figure given by the previous agent.

³⁵ Bureau of Indian Affairs, 1881; 1882; 1883; and 1884. The figures in each case are taken from the "Table of Statistics Relating to Indian Population and Education." The Navaho agent in 1881 was G. Eastman. He was followed by the widely respected D. M. Riordan, who served until 1885.

³⁶ It must be understood that the accuracy of these figures cannot be authenticated. The sole purpose of these computations is to illustrate the magnitude of the discrepancies to be found among the official population reports of this period.

period is over four times higher than that implied in the vital rates reported for the last year of the period in question.

It should be noted that although the area encompassed by the reservation was increased by about 150 percent during the years between 1877 and 1884, the population figures quoted above purported to refer to the entire Navaho population in each case, so that the reported increase in numbers cannot be attributed to the inclusion of greater numbers of formerly off-reservation Navahos (see map 3, p. 24).

It must be concluded that during the period just reviewed, the methods of enumeration-by-assembly that had been developed at Fort Sumner and continued at Fort Defiance became increasingly inadequate as the Navaho gradually spread out into their former lands. As a result, the reported totals for this period reflect little more than the personal opinion of the reporting agents.

PERIOD 4. 1886-1909

The fourth period in the development of the population records of the Navaho Indians is marked by the development of the first Navajo Tribal Roll in 1885, followed by the completion of the first special census conducted by the Bureau of the Census in 1890. The period closes with the inauguration of a more detailed system of population records when the Navajo Reservation was subdivided into several agencies in 1910.

When one considers the nature of the facilities available at the time, the preparation of the first tribal roll in 1885 must be regarded as a remarkable achievement. (Aycock, MS.) Equally remarkable, however, are the serious defects apparent in the data as recorded. In the first place, the coverage of the 1885 roll was limited to the Navahos residing within the confines of the reservation. In his recapitulation of the totals, the recording clerk reported a total of 13,003 Navahos on the roll, but added an estimate of 8,000 Navahos residing off the reservation, for an estimated grand total of 21,003. Thus the 1885 roll included only 62 percent of the estimated total Navaho population at this time.

Secondly, examination of the roll itself reveals a number of curious omissions and arbitrary classifications. Children under 6 years of age were not listed separately, and no married couples under the age of 26 appear on the roll. As a result, the median age of the enrolled population comes to 21.1 years, which is several years older than the median ages for Navaho population groups at all later periods.³⁷

³⁷ The above figures, and those mentioned later in connection with the 1885 roll, are derived from a 5-percent sample of the roll in the National Archives as recorded by me. Both the figures quoted and the conclusions reached are supported by a cursory examination of the entire roll. The deficiencies that were revealed in this preliminary examination indicated that the drawing of a larger sample would not be warranted.

Thirdly, the listing procedures were themselves inappropriate in that no recognition was given to the matrilineal system under which the typical Navaho family is organized. Instead, each family group was listed according to the surname of the male head; i.e., patrilineally. In theory, such a procedure would not necessarily create insuperable difficulties in the actual preparation of the roll, but it could and did greatly complicate the task of maintaining the roll in later years when it became necessary to record additional family members according to their father's name when the person in question was likely to be known and recorded elsewhere according to his mother's name. An incidental feature of the listing procedure added still further complexity to the problem of identifying individual enrollees: Navaho names were crudely "translated" by the recording clerks into some sort of English equivalents, but the result was a bewildering variety of spellings. In not a few instances, the clerks apparently abandoned any attempt to record the Navaho name given them, and merely "assigned" a common English name to the person in question. Still further evidence of the artificiality with which the Navaho population was classified in the familiar categories appropriate to American social structure is to be found in the total absence of polygynous marriages on the roll. It is possible that plural wives may have been listed as daughters in a few cases, but the impression of the reported ages does not permit any definite conclusions in this regard.

A final source of error on the 1885 roll is to be found in the recording of ages. The roll was prepared on a large ledger, similar in design to the conventional enumeration schedules whereon all information for a given individual can be entered on a single data line. The male head of a given family was listed first, followed by his wife and their children. In the 1885 roll, however, this procedure resulted in an interesting bias. Most Navaho families appear to have reported their children by sex rather than by age, giving (in most cases) the names of their female children first. Since the age of each person listed had to be recorded, and the Navaho seldom knew or could communicate their own or their children's ages effectively, the recording clerk apparently adopted the practice of merely totaling the number of children reported for a given family, assigning some plausible age to the first child listed, and then assigning ages to all the succeeding children at 2- or 3-year intervals.

As a result of this intriguing innovation, only 5 of the 70 families contained in a 5-percent sample of the 1885 roll have children of both sexes with overlapping ages. Of the remaining 65 families, 49 have all their female children recorded as being older than all of their male children, and 16 have all of their male children recorded as being older than all of their female children. This listing bias

produces a median age for the male children of 12.3 years, as contrasted with a median age for all female children of 15.5 years.³⁸

In summary, it would be difficult to find a document that is less useful or more misleading for purposes of demographic analysis than the 1885 roll of the Navajo Reservation population. With its deficient coverage, artificial classification, and apparent errors in the recording of names, relationships, and ages, the 1885 roll must remain an outstanding example of the fictitious results to be obtained when the members of a given culture are enumerated according to procedures appropriate to a different culture.

The figures given in the annual reports for the years immediately following the preparation of the 1885 roll give rise to additional problems of interpretation. The report for 1886 gave the total population of the Navaho "as numerically enrolled" as 17,358. This was said to represent an increase of 164 "since the last census." These statements are inconsistent with the information concerning the 1885 roll. The estimated total population in 1885 would, according to the 1886 report, have come to 17,194 rather than the reported estimate of 21,003.³⁹ There are a number of possible explanations for this discrepancy, but all of them are highly conjectural. It is possible that the agent reporting in 1886 regarded the estimate of 8,000 off-reservation Navahos as too high. In any event, the figure of 17,358, rather than the 1885 figure of 21,003, became the base figure for the population reports of the several years following. It should be noted that this lower figure also corresponds closely to the figure of 17,604 as reported by the Bureau of the Census on the basis of its special enumeration in 1890.

The official reports for the years 1887 to 1889 present a general picture of a rapidly increasing population, but examination of the data contained in these reports does not support their credibility. For example, the 1886 report does not permit computation of exact sex ratios, because the age groupings given indicate a serious deficiency in the number of males, with 3,322 males over 18 as compared with 6,344 females over 14 (Patterson, 1886, p. 204).

By contrast, the report for 1887 reverses the implied sex ratio, reporting a total male population of exactly 10,000, and a total female

³⁸ In the annual report of 1885, the number of Navaho children "between the ages of 6 and 16" was reported as 6,404, or 30.5 percent of the total reported Navaho population of that year. By contrast, the 5-percent sample taken from the 1885 roll included 273 persons aged 7 through 15, which comes to 39 percent of the total sample. This higher proportion is higher than that reported for any subsequent Navaho population, and suggests that the procedure whereby ages were "assigned" to the Navahos on this roll tended to underestimate the intervals between children. Starting with a fairly accurate age for the eldest child, such a procedure would produce an upward bias in age estimation for succeeding children.

³⁹ Patterson, 1886. The age groupings shown in this report are overlapping, but the total given seems to take this into account.

population of 7,838 (Patterson, 1887). Since both reports were submitted by the same agent, and neither report contains any reference to the apparent variation in these sex ratios, it must be concluded that only the totals represent serious estimates, and the remaining details are largely fictitious.

In 1888, the same agent (Patterson, 1888) reported a total of 6,520 males over 18, and 4,875 females over 14, with a total Navaho population at all ages of 18,000. In 1889, C. E. Vandever replaced S. S. Patterson as Navaho agent, and although his first report (Vandever, 1889) repeated the figure of 18,000 as given by his predecessor, Agent Vandever apparently came to the conclusion that the previous report was a serious overestimate of the actual Navaho population. In his report for 1890, Agent Vandever (1890, p. 161) reported as follows:

I estimate the total population at from 14,000 to 15,000, the sexes about equal, and the families averaging between 4 and 5. The births for the year I estimate at 410, and the deaths at 900. . . . [due to] a throat disease bearing a close resemblance to diphtheria. . . .

Although this report demonstrated a certain amount of critical judgment, the results of the census taken in that year would seem to indicate that Patterson's estimates were closer to reality than Vandever's.⁴⁰ However, the results of this first special enumeration were not generally regarded as reliable insofar as the coverage of the Navaho population was concerned. Thus the apparent failure of the agents reporting after 1890 to utilize the 1890 census figure as a base is not necessarily due to carelessness or ignorance. By 1894 (p. 499), the estimated total Navaho population had been revised upward to a figure of 20,500. This figure was merely repeated in the reports for the years 1895 to 1898. In 1899 (p. 562) this figure was rounded to an even 20,000, which figure was again repeated, with minor variations, until 1910.⁴¹

In summary, the fourth period in the development of the Navaho population records of the Bureau of Indian Affairs does not reveal any fundamental improvement despite the preparation of the 1885 roll and the occurrence of the first special enumeration by the Bureau of the Census in 1890. The only significant change to be noted in this period is that the figures reported tended more frequently to be labeled as estimates rather than being presented as actual counts.

⁴⁰ It is noteworthy that the Bureau of the Census, in its first enumeration of the Indian population, obtained a total of 17,204 Navahos in this same year. This enumeration is discussed in greater detail on pp. 103 ff.

⁴¹ The basic estimate of 20,000 Navahos was actually the sum of three estimates: 12,000 for the Southern, Eastern, and Northern Agencies, 6,000 for the Western Agency, and 2,000 within the area of the Hopi Reservation. The minor variations in these estimates reflect changes in the estimated number of Navahos residing on the Navajo Extension. Their number was variously given as between 390 and 500. See, for example, Bureau of Indian Affairs, 1905; 1906; 1907; and 1908.

PERIOD 5. 1910—PRESENT

The fifth and final period in the development of the population records of the Navaho begins with the completion of the second special enumeration of Indians by the Bureau of the Census, and closes with the preparation of the tribal roll in 1939. In addition to the occurrence of the census, the year 1910 marked the inauguration of a more detailed system for recording population data. The reservation was subdivided into five areas, each to be administered by a separate agency. These agencies remained separate until 1934, when they were again combined into a single agency with headquarters at Window Rock, Ariz.

In this subdivision, the original agency, with headquarters at Fort Defiance, became known as the Southern Agency. The remainder of the reservation was composed of the Western Agency, with headquarters at Tuba City, Ariz.; the San Juan or Shiprock Agency (later known as the Northern Agency) with headquarters at Shiprock, N. Mex.; the Leupp Agency, with headquarters at Leupp, Ariz.; and the Eastern Agency, with headquarters at Pueblo Bonito, N. Mex. (later moved to Crownpoint, N. Mex.). In addition, the Hopi Agency was established for the Hopi Reservation,⁴² but a number of Navahos remained under its jurisdiction as well.⁴²

Each of these separate agencies was charged with the responsibility of maintaining its own population records and submitting its own reports to the Commissioner of Indian Affairs. Accordingly, the several rolls that were originally prepared by the separate agencies have been maintained as separate documents. This division had the further advantage that the population figures could be presented by State as well as by agency, so that comparisons with census figures could be made in greater detail. The figures on the population in the several agencies were actually reported under separate school jurisdictions, one or more of which was established in each agency. Since these jurisdictions included Hopi, Paiute, and Eastern Pueblo Indians, as well as Navaho, the figures submitted by each agency were further classified by tribe. A further improvement of this reporting system was that after 1910 estimates were provided of the number of school-age children in each school jurisdiction. Since the approximate ratio of school-age children to total population can be determined with some reliability, comparisons of the reported number of school-age children with reported total population figures can be made in considering the internal consistency of any given population figures.

⁴² The approximate boundaries of these subdivisions can be determined from an examination of map 4, p. 126: the Western Agency comprises land management districts 1, 2, and 3; the Southern Agency comprises 4, 7, 10, 11, 14, 17, and 18; the Eastern Agency comprises 15, 16, and 19; the Northern Agency comprises 8, 9, 12, and 13; the Leupp Agency comprises No. 5; and the Hopi Agency comprises No. 6.

In considering the series of population figures reported by the Bureau of Indian Affairs during this period, it is helpful to bear in mind the official population totals reported by the Bureau of the Census on the basis of its special Indian enumerations of 1910 and 1930 (table 15). The figures reported by the separate Navaho agencies during the period in question are shown for selected years in table 16. In addition to the reported population totals, these two tables include the reported or estimated number and proportion of the population of school ages. The specific age group which comprises the population of school age was not indicated in the annual reports of the Bureau of Indian Affairs until 1927, when it was defined as the population aged 6 to 18 years, inclusive. Unless otherwise specified, all estimates of the school-age population that I have prepared pertain to the age-group 6 to 18, inclusive. Comparisons of the figures reported for this school-age population would seem to indicate that the age group referred to is, in general, 6 to 18 years.

In comparing the population estimates of the Navaho agents with the census figures for 1910 and 1930, we find that the total Navaho population as estimated by the reporting agent in 1910 was 18.6 percent above the official 1910 census figures. In 1930, by contrast, the estimate of the Navajo Agency is only 4.6 percent above the census figure. Although neither source can be regarded as completely accurate, the evident convergence between the independent figures suggests some improvement in the quality of the population data recorded for the Navaho during this period.

TABLE 15.—*Enumerated Navaho population, by sex, with estimated number and percent of school age, censuses of 1910 and 1930*

Age group	1910 ¹						1930 ²					
	Total		Males		Females		Total		Males		Females	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages ³ -----	22, 377	100. 0	11, 305	-----	11, 072	-----	39, 064	100. 0	19, 776	-----	19, 288	-----
6-18 years ⁴ ---	7, 942	35. 5	4, 058	35. 9	3, 884	35. 1	13, 208	33. 8	6, 684	33. 8	6, 524	33. 8

¹ Bureau of the Census, 1915, tables 30, 51, 83, and 92.

² Bureau of the Census, 1937, table 21.

³ Omitting 78 persons (41 males and 37 females) of unknown age reported in 1910.

⁴ The population aged 6-18 years, inclusive, was estimated by applying Sprague multipliers to the age groups 5-9 and 15-19 for each sex. These multipliers provide estimates of the population by single years of age. Subtracting the estimated number aged 5 and 19 from the sum of the three age groups 5-9, 10-14, and 15-19 gives the desired figures for the population aged 6-18 years. The use of these multipliers is discussed in Jaffe, 1951, pp. 94 ff.

The most salient features of the annual estimates of the reporting agents following 1910 are the erratic fluctuations in the estimated population totals and the still greater fluctuations in the estimated number of school-age children. With respect to variations in the total population, the greatest increase occurs at the beginning of the period, when

TABLE 16.—*Reported estimates of Navaho population, all ages and school age, by State and agency, for selected years—1910-30*

State and agency	1910 1		1911 2		1912 3		1915 4		1916 5		1918 6		1919 7		1920 8	
	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age
Total Navaho	26,624	-----	30,006	9,475	30,224	8,579	30,871	8,387	31,348	10,536	31,397	11,024	29,672	10,895	30,473	10,579
Percent of school age	-----	31.6	-----	31.6	-----	25.4	-----	27.2	-----	33.6	-----	35.1	-----	36.7	-----	34.7
Arizona:																
Hopi 15	3,804	-----	4,118	1,000	4,068	940	4,193	1,250	4,203	1,206	4,225	1,078	4,000	1,103	4,227	1,172
Navaho	17 2,000	-----	17 2,000	483	2,000	462	2,000	18 593	2,000	18 574	1,940	18 495	1,842	18 508	2,000	18 554
Leupp (Navaho)	17 10,000	-----	17 10,000	250	1,200	425	1,700	331	1,761	458	1,441	623	1,441	623	1,289	496
Southern Navaho	-----	-----	-----	2,500	10,000	2,500	10,000	17 2,500	11,915	4,411	12,080	4,550	11,280	4,585	11,280	4,400
Western Navaho	6,445	-----	6,508	2,610	6,535	1,500	6,550	1,213	6,550	1,217	6,565	1,250	6,360	1,280	6,300	1,366
Navaho	17 6,155	-----	6,125	2,450	6,131	1,409	6,098	18 1,129	6,087	18 1,131	6,087	18 1,159	5,915	18 1,190	5,942	18 1,267
New Mexico:																
Eastern Navajo 19	17 2,783	-----	2,686	1,221	2,685	1,221	2,715	17 1,221	2,724	17 1,240	2,724	1,250	2,275	1,000	2,700	900
Northern Navajo 16	17 5,500	-----	8,000	2,500	8,000	2,500	8,000	17 2,500	6,483	17 2,617	6,500	2,747	6,550	2,879	7,000	2,873
Southern Pueblo	4,351	-----	4,391	1,355	4,552	1,355	8,421	2,479	8,535	2,375	8,896	2,416	8,724	2,595	7,037	1,732
Navaho	191	-----	195	67	208	62	338	13 110	378	18 105	625	18 170	8,369	18 110	7,302	18 89

State and agency

State and agency	1921 9		1923 10		1924 11		1927 12		1928 13		1929 14		1930 15	
	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age	All ages	School age
Total Navaho.	31,414	10,018	30,785	10,404	30,778	7,578	34,462	6,963	35,212	7,077	40,856	11,363	40,856	11,363
Percent of school age	31.9		33.8			24.6		20.2		20.1		27.8		27.8
Arizona:														
Hopi 16	4,936	1,306	4,836	1,237	4,911	1,226	5,233	1,145	5,224	1,145	5,756	1,037	5,756	1,037
Navaho	2,700	18,714	2,500	18,639	2,575	18,679	2,575	18,602	2,750	18,693	3,321	1,312	3,321	1,312
Leupp (Navaho)	1,291	455	980	371	1,181	371	1,251	352	1,051	562	1,788	585	1,788	585
Southern Navajo	11,280	4,000	11,280	5,395	11,280	3,000	17,126	2,611	12,662	2,914	3,778	15,884	5,446	15,884
Western Navajo	6,463	1,224	6,463	7,736	6,800	1,500	7,889	1,380	7,899	1,178	1,691	4,508	1,691	4,508
Navaho	5,982	1,132	5,989	1,679	6,500	1,434	17,750	1,310	7,500	1,118	1,465	4,095	1,465	4,095
New Mexico:														
Eastern Navajo 19	2,800	800	2,800	850	3,000	518	17,300	900	3,709	800	826	7,401	2,495	7,401
Northern Navajo 19	7,000	2,813	7,000	2,400	6,000	1,500	17,030	1,093	7,030	1,080	2,564	8,399	2,564	8,399
Southern Pueblo	6,800	1,933	5,579	5,674	5,674	1,737	6,099	1,422	5,720	1,412	1,474	6,937	1,474	6,937
Navaho	361	18,103	236	18,70	239	18,76	409	13,95						

¹ Bureau of Indian Affairs, 1911, table 7.

² Bureau of Indian Affairs, 1911, tables 2 and 24.

³ Bureau of Indian Affairs, 1912, tables 2 and 24.

⁴ Bureau of Indian Affairs, 1915, tables 2 and 18.

⁵ Bureau of Indian Affairs, 1916, tables 2 and 18.

⁶ Bureau of Indian Affairs, 1918, tables 2 and 17. The figures given for the Southern, Western, and Eastern Navajo Agencies were repeated from the report of the previous year.

⁷ Bureau of Indian Affairs, 1919, tables 2 and 17.

⁸ Bureau of Indian Affairs, 1920, tables 3 and 18.

⁹ Bureau of Indian Affairs, 1921, tables 1 and 2.

¹⁰ Bureau of Indian Affairs, 1923, tables 1 and 2.

¹¹ Bureau of Indian Affairs, 1924, tables 1 and 2. The total for the Hopi Agency included 265 Tewas so specified. The figure of 6,000 given for the Northern Navajo Agency may be an error in transcription, since the corresponding figure for all the other years from 1920 to 1928 was 7,000.

¹² Department of the Interior, 1928, tables 1 and 2. In this report, the population of school age is specified for the first time as comprising ages 6-18 inclusive.

¹³ Department of the Interior, 1928, tables 1 and 2. All of the figures given for the Navajo population of all ages are repeated from the report of the previous year.

The differences in New Mexico are due to shifts in jurisdiction (see footnote 18 below).

In 1928, the Canonicito and Puertocito bands of Navahos were shifted from the jurisdiction of the Southern Pueblo Agency to that of the Eastern Navajo Agency.

These two bands numbered 409 in 1927. In addition, the Ramah band of Navahos was specified for the first time as being included in the Eastern Navajo Agency.

Judging from the increase reported for this agency between 1927 and 1928, the

Ramah band must have numbered 300 at this time. The records are unclear as to the jurisdiction under which the Ramah Navaho were included prior to 1928.

¹⁴ Department of the Interior, 1929, appendix. Figures on total population were not published in this report.

¹⁵ Department of the Interior, 1930, tables 2 and 3.

¹⁶ Until 1924, the Hopi Agency reported data on Hopis and Navahos; from 1924-27, this agency included data on approximately 275 Tewas; thereafter, it again reported only Hopis and Navahos. In addition to Navahos, the Western Navajo Agency reported data on Hopis and Paiutes. They numbered approximately 200 each until 1924, when the number of Paiutes rapidly declined and the number of Hopis gradually increased. The bulk of the Indians reported in the Southern Pueblo Agency were of course Pueblos. In 1925, the Navahos reported with the Southern Pueblo Agency were specified for the first time as being from the Canonicito and Puertocito communities.

¹⁷ Originally reported to be an estimate. Of course, all totals which include this estimate among their components are themselves estimates, perforce.

¹⁸ My estimates of the Navaho population of school age. These are shown immediately below the particular Indian population of school age with which they were originally reported. These figures were obtained by assuming that the proportion of school age to total Navaho in a particular agency was equal to the proportion of school age to total Indian reported for that agency. The total Navaho population of school age for any given year is the sum of the Navaho school-age population for the several agencies, either as reported originally or as estimated by me.

¹⁹ Until 1927, the Eastern Navajo Agency was called the Pueblo Bonito Agency, and the Northern Navajo Agency was called the San Juan Agency.

the reported total population jumps from 26,624 in 1910 to 30,006 in 1911. This implausible increase was due largely to an unexplained increase in the estimated population of the Northern Agency (from 5,500 in 1910 to 8,000 in 1911) together with a 10 percent increase in the estimated population of the Leupp and Southern Agencies (from 10,000 in 1910 to 11,000 in 1911). The latter increase can be attributed to the fact that the two agencies were not separately reported in 1910, while in 1911, the Southern Agency figure was again given as 10,000, but the Leupp Agency was separately reported as 1,000. The crudity of these estimates is further indicated by the fact that the figures of 10,000 for the Southern and 8,000 for the Northern Agencies are repeated, without change, in the reports for each year from 1911 to 1915.

From 1911 to 1918, the estimated total Navaho population as given by the Navajo Agency increased, with minor changes, from 30,006 to 31,397, which would imply an average annual rate of increase of only 0.65 percent. However, it should be noted that the 1911 figure is about one-third higher than the figure reported in the 1910 census, so that the implicit rate of increase cannot be relied upon.

The figures reported for 1918 and 1919 are particularly interesting because of their apparent reflection of the impact of the influenza pandemic. The total Navaho population in 1919 was estimated as 29,672, a decline of 5.5 percent from the figure of the previous year. Examining the data for the separate agencies, it can be noted that the Northern Agency reported a slight increase, the Leupp Agency reported no change, and the remaining agencies reported declines of varying severity. Although data on the causes of Navaho mortality at this time are lacking, the indicated declines suggest that the estimates given were not the mere repetitions or arbitrary upward revisions that were so common in earlier years.

In the early 1920's, the reported estimates of total Navaho population continue to fluctuate between 30 and 32,000, with an unexplained decline of 1.8 percent between 1922 and 1923, followed by an implausible increase of 3.8 percent between 1925 and 1926. The average annual increase between 1919 and 1930, as implied in the figures given by the Navajo Agency for those years, comes to 2.95 percent, a rate which has only been exceeded in a few countries since World War II. The fact that the implied rates of increase during the 1920's are very high, while those of the 1910's are quite low, suggests that the population estimates made around 1920 may have been seriously deficient, despite the presumable impact of the influenza pandemic. However, these rates lend greater support to the further hypothesis that the 1910 figures submitted by the Navajo Agency were considerably exaggerated.

After 1928, the figures submitted by the several Navaho agencies were derived from extensive surveys and enumerations that were carried out in connection with the preparation of up-to-date tribal rolls for each agency. The first of these surveys was carried out in the years 1928 to 1929. At this time, each Navaho was issued a disk on which was stamped his census number. The original plan called for the execution of supplementary surveys at 3-year intervals, whereby births, deaths, and changes in family formation and residence occurring in the interim could be duly recorded on the existing rolls.⁴³ A number of supplementary rolls were prepared in the 1930's but no complete recanvassing of the entire reservation area has been carried out since the initial survey of 1928-29. Thus the rolls prepared on the basis of the 1928-29 survey have not undergone fundamental revision since that time, although the set of rolls compiled in 1939 did take into account reported births and deaths up to that time. After 1939, reported births and deaths were merely noted on the 1939 rolls.

The figures reported during the decade of the 1930's (table 17) reflect important improvements in the quality of the population data available to agency officials. As noted previously, the 1930 figure was not greatly in excess of the census figure. The same is true of the figures submitted at the close of the 1930 decade, when the total of 48,796 as of January 1, 1940, coincides almost exactly with the total of 48,722 as obtained from preliminary tabulations of the 1940 census. Internal comparisons of the average annual rates of increase implied in the figures reported for 1930, 1934-35, and 1939-40 suggest that the figures given in 1934-35 may have been somewhat low. The average annual rate of increase between 1930 and 1934-35 (as implied in the figures shown in table 17) is 1.3 percent, while that implied in the figures for 1934-35 and 1939-40 is over 2.4 percent. These comparisons suggest that the actual Navaho population in 1934-35 was in the neighborhood of 44,000.

Turning next to a consideration of the reported numbers of school-age children during this period, it should be repeated that the precise ages were not specified until 1927, when the category was defined to include all persons aged 6 through 18 years. However, this lack of precision in definition is scarcely objectionable in a situation where-

⁴³ From discussion with J. Nixon Hadley, September 10, 1957. The procedure for these surveys is outlined in National Archives, Record Group 75, File No. 20753-1929-034, dated November 27, 1929, as follows:

The method was the same in all jurisdictions. The enumeration schedule shows name, age, sex, degree of blood, marital condition, relationship to head of family, and enumeration or identification number. . . . The identification numbers . . . indicated both the jurisdiction and the district in which the Indian was enumerated. . . . [He received a disk with his number on it.]

The enumeration schedules were forwarded to the agency office where the data were transcribed to two sets of cards—the individual card and the family card. [The former were] filed alphabetically . . . [and the latter were] filed by the [identification] number of the head [of the family].

TABLE 17.—*Reported estimates of the population of the Navajo Agency, all ages and school age, by State—1935, 1940, and 1945*¹

State	1935 ²		1940 ³		1945 ⁴	
	All ages	School age	All ages	School age	All ages	School age
Total Navaho	43, 254	14, 405	48, 796	12, 499	55, 458	19, 194
Percentage of school age		33. 3		25. 6		34. 6
Arizona	21, 424	6, 604	26, 032	7, 297	28, 836	10, 529
New Mexico	21, 830	(7, 801)	22, 460	5, 124	26, 268	(8, 543)
Utah	(⁵)	(⁵)	304	(78)	354	(122)

¹ The data for these 3 years pertain to the fiscal years ending on June 30 of the year specified. The figures in parentheses are my estimates, obtained on the assumption that the proportion of school-age to total Navaho is equal to the proportion of school-age to total Indians as reported for the area specified.

² Bureau of Indian Affairs, 1936, appendix tables 2 and 3.

³ Bureau of Indian Affairs, 1940, statistical supplement tables 3 and 5.

⁴ Bureau of Indian Affairs, 1945, statistical supplement tables 2 and 5.

⁵ A total of 307 Navahos residing in Utah were reported with the Western Navajo Agency in Arizona.

in a high proportion of the reported ages are themselves only approximations. In order to consider the internal consistency of the reported population totals as given in table 16, it was necessary to determine the number of school-age children in the corresponding areas. These figures are recorded as given for those jurisdictions having populations exclusively Navaho. For other jurisdictions, however, the reported school-age populations include some Hopis, Paiutes, or Eastern Pueblos. In such areas, the number of school-age Navahos was estimated on the assumption that the proportion of Navaho to total school-age children in a given jurisdiction was equal to the proportion of total Navaho to total Indians in that jurisdiction.

When the estimated numbers of school-age Navahos are expressed as percentages of the corresponding population totals, a number of interesting features become apparent. To begin with, the school-age population of the Southern Navajo Agency, whose total population comprises about one-third of the total Navaho population, was reported as exactly 25 percent of the total agency population until 1915. Secondly, the estimated school-age population in the Western Navajo Agency declined from 2,450 in 1911 to 1,409 in 1912, with no corresponding change in the total population of the area. The proportion of school age to total Navaho reported for this agency remains below 25 percent until 1925. An equally drastic revision in the opposite direction is apparent in the reports of the Southern Agency for the years 1915 and 1916. The estimated school-age population of this agency was 2,500 in 1915, but it rose to 4,411 in 1916, so that the proportion of school-age Navahos in this agency rises in a single year from 25 to 37 percent.

Since a number of existing age distributions for the total Navaho population indicate that the true proportion of school age to total Navaho is close to 35 percent, it is apparent that the low proportions reported for the above agencies reflect either a serious underestimate

of the number of school-age Navahos or a serious overestimate of the size of the total population, or both (see pp. 139-149).

In general, the estimated proportions of school-age Navahos remain within a fairly plausible range during the early 1920's. These proportions vary from a high of 36.7 percent in 1919 to a low of 31.9 percent in 1921. However, between 1923 and 1924, they drop from 33.8 percent to 24.6 percent. This decline is due largely to a further drastic downward revision in the number of school-age Navahos estimated for the Southern Agency, from 5,395 in 1923 to 3,000 in 1924. The former figure amounts to 47.8 percent of the total population reported for the agency, while the latter comes to only 26.6 percent of the total. It is apparent that either or both figures are seriously in error. A similar downward revision of the estimated numbers of school-age children is apparent in the reports of the Northern Navajo Agency, where the proportion of school-age Navahos reaches a low of only 11.3 percent in 1930.⁴⁴

The cumulative effect of these revisions was to produce estimated proportions of school-age Navahos that were well below plausibility, ranging from a low of 20.2 percent in 1927 to a high of 27.8 percent in 1930.

By 1935, however, the estimates of persons of school age had been substantially improved, so that the proportion of school-age Navahos in all agencies comes to 33.3 percent, despite an obvious serious deficiency in the figures reported by the Hopi Agency in regard to school-age Navahos.⁴⁵

In 1940, despite the apparent accuracy in the total population figures, the reported numbers of school-age children were again seriously defective. The proportions of school age to total population for that year are 28.0 percent in Arizona, and 22.8 percent in New Mexico, for an overall proportion of 25.6 percent. A possible explanation for the low percentage reported for Arizona lies in the fact that an estimated 3,000 persons not on agency rolls were added to the reported total for that State. There is no indication that a corresponding addition was made to the reported number of Navahos of school age in Arizona. However, the even greater deficiency apparent in the figures for New Mexico cannot be explained (see pp. 139-149).

The figures shown for 1945, finally, represent the further adjust-

⁴⁴ In tracing these fluctuations, it must be stressed that neither the estimated number of Navahos of school age nor the estimated total Navaho population can be regarded as fully reliable benchmarks. With the majority of Navaho children not enrolled in any school until after World War II, the estimates of their number are as unreliable as those of the total population. It should be added, in this connection, that the Navaho police were active during this period in corraling Navaho children in an effort to force them to attend school. This practice undoubtedly resulted in the concealment of many children from the authorities. With the cessation of this practice in 1935, the reported numbers of school-age Navahos experienced a substantial rise.

⁴⁵ In 1935, the Hopi Agency reported 199 school-age Navahos out of a total Navaho population estimated at 3,458. The actual number of school-age Navahos in this population would probably be at least 1,000 higher than reported.

ments that were made in determining the number of school-age Navahos preparatory to the intensive efforts at bringing these children into schools after the close of World War II. The proportion of school-age Navahos as reported in 1945 is 34.6 percent of the total population. Since that time, this proportion has remained in the neighborhood of 35 percent (Young, 1957, p. 281).

Further insight into the quality of the population data collected at this time can be gained from an examination of the several agency rolls which were prepared on the basis of special surveys carried out by the respective agency superintendents during the period from 1929 to 1939. Although all of these surveys are subject to limitations in coverage and procedure, they provide a useful series of benchmarks for the analysis of trends in the growth of the Navaho population, and permit interesting comparisons. A few of these special surveys appear to have been conducted with skill sufficient to provide fairly reliable data on the age distribution and certain other characteristics of the population covered. The total enrolled population, by sex, and the total and school-age population as obtained by me from samples of the original rolls, are shown in tables 18-20.⁴⁶

Table 19 also contains a number of synthetic totals computed for the Ramah Navaho community on the basis of genealogical records which extend from 1880 to 1948. These synthetic totals were obtained by summing the reported figures for a series of 4-year periods: 1880 to 1883, inclusive; 1885 to 1888, inclusive; 1890 to 1893, inclusive; etc. This procedure was adopted in order to minimize the effects of random fluctuations occurring in the figures reported from year to year. Because of the very small numbers involved, such fluctuations would otherwise seriously distort some of the relationships found in the data.⁴⁷

The major significance of the figures given in tables 18, 19, and 20 lies in the uniformly high proportions of the populations sampled that are of school age. This uniformity is especially remarkable in view of the undoubtedly approximate nature of a considerable proportion of the reported ages. As might be expected because of the small frequencies involved, the widest variation in these proportions is found in the data for the Ramah community, where a low of 29.7 percent was obtained for the period 1895 to 1898, and a high of 41.6 percent for the period 1910 to 1913. In general, however, the proportions aged 6 to 18 lie between 30 and 40 percent, with the average coming very close to 34 percent.

⁴⁶ Many of the original agency rolls prepared from special canvasses of the reservation during this period are on file in the National Archives, Interior Branch, Record Group 75. A number of these rolls were examined by me, and samples of the data contained thereon were obtained. Table 18 presents the official totals reported on the rolls and the sample totals obtained therefrom.

⁴⁷ These data were compiled by the late Prof. Clyde Kluckhohn. They were supplied through the courtesy of Dr. David F. Aberle, with the permission of Professor Kluckhohn.

TABLE 18.—*Enrolled Navaho population for selected agencies, bands, and periods—1910-34*¹

Agency, period, and sex	Total enrolled population ²		Sample data ³			
	Number	Percent	All ages		School age (6-18)	
			Number	Percent	Number	Percent
Pueblo Bonito, 1910: ⁴						
Both sexes.....	2,626	100.0	499	100.0	195	39.1
Male.....	1,132	43.1	232	100.0	103	44.4
Female.....	1,494	56.9	267	100.0	92	34.4
Fort Defiance, 1915: ⁵						
Both sexes.....	11,915	100.0	1,236	100.0	470	38.0
Male.....	5,769	48.4	621	100.0	224	36.1
Female.....	6,146	51.6	615	100.0	246	40.0
Leupp, 1915: ⁶						
Both sexes.....	850	100.0	200	100.0	74	37.0
Male.....	388	45.6	91	100.0	36	39.6
Female.....	462	54.4	109	100.0	38	34.9
San Juan, 1916: ⁷						
Both sexes.....	6,354	100.0	680	100.0	231	34.0
Male.....	3,152	49.6	337	100.0	123	36.5
Female.....	3,202	50.4	343	100.0	108	31.5
Eastern Navajo, 1930: ⁸						
Both sexes.....	7,413	100.0	728	100.0	247	33.9
Male.....	3,618	48.8	355	100.0	123	34.6
Female.....	3,795	51.2	373	100.0	124	33.2
Leupp, 1933: ⁹						
Both sexes.....	1,882	100.0	378	100.0	145	38.4
Male.....	934	49.6	194	100.0	68	35.0
Female.....	948	50.4	184	100.0	77	41.8
Hopi, 1934: ¹⁰						
Both sexes.....	3,583	100.0	395	100.0	150	38.0
Male.....	1,888	52.7	210	100.0	73	34.8
Female.....	1,695	47.3	185	100.0	77	41.6

¹ The data shown in this table were obtained from copies of Navaho tribal rolls.² These totals were obtained from the recapitulation sheet or summary report which accompanied each roll when it was submitted by the reporting official.³ Sample data were obtained by first selecting a sample of the sheets or pages on which the names were recorded. This was accomplished by selecting every nth page, starting with a randomly selected number between 1 and n. For the smaller rolls, a page interval (n) of 5 was used, while for the larger rolls, the interval was increased to 10. The age and sex of each single person listed on a sample page and of each family member whose head was listed on a sample page were recorded. The resultant sample size is approximately equal to the reciprocal of the interval used times the total population.⁴ Stacher, MS. a.⁵ Paquette, MS.⁶ Janus, MS.⁷ Kurth, MS. This enumeration appears to have been carried out with unusual care and competence.⁸ Stacher, MS. b. Although the cover of this roll is dated April 30, the numbered pages of the roll itself are dated June 30, 1930.⁹ Hammond, MS. a.¹⁰ Hammond, MS. b.

It should be noted that uncertainty with respect to the actual proportion of school-age children to total population has given rise to considerable variation in the total Navaho population estimates that have been made since World War II, when the school censuses have been used repeatedly in arriving at estimates of the total. In one report, for example, the proportion of school age to total Navaho was

assumed to be "at least" 26 percent, since this was the proportion obtained from data pertaining to the general population of the United States.

Applying this proportion to the estimated school-age Navaho population for the year 1945-46 produced an estimated total Navaho population of over 82,000.⁴⁸ At the other extreme, the proportions aged 5 to 9, 10 to 14, and 15 to 19 as reported in the Human Dependency Survey of 1936-38 were summed, giving a percentage of 40.6 for the age group 5 to 19, inclusive. As a further check of this figure, a

TABLE 19.—*Enrolled Navaho populations for selected agencies, bands, and periods—1880-1948*¹

Agency or band and period	All ages						Ages 6-18					
	Both sexes		Male		Female		Both sexes		Male		Female	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent
Puertocito and Canonicito bands:												
1915 ²	356	100.0	170	47.8	186	52.2	133	37.4	64	37.6	69	37.1
1916 ³	375	100.0	179	47.7	196	52.3	120	32.0	55	30.7	65	33.2
1920 ⁴	355	100.0	171	48.2	184	51.8	133	37.5	66	38.6	67	36.4
Leupp Agency: ⁵												
1929	1,689	100.0	852	50.4	837	49.6	613	36.3	308	36.2	305	36.4
Ramah Navaho: ⁶												
1880-1948	16,278	100.0	7,992	49.1	8,286	50.9	5,589	34.3	2,684	33.6	2,905	35.0
1880-98	1,472	100.0	695	47.2	777	52.8	506	34.4	224	32.2	282	36.3
1880-83	250	100.0	114	45.6	136	54.4	91	36.4	36	31.6	55	40.4
1885-88	303	100.0	137	45.2	166	54.8	125	41.2	52	38.0	73	44.0
1890-93	390	100.0	187	47.9	203	52.1	133	34.1	55	29.4	78	38.4
1895-98	529	100.0	257	48.6	272	51.4	157	29.7	81	31.5	76	27.9
1900-1918	3,663	100.0	1,890	51.6	1,773	48.4	1,415	38.6	755	39.9	660	37.2
1900-1903	673	100.0	347	51.6	326	48.4	239	35.5	127	36.6	112	34.4
1905-08	845	100.0	437	51.7	408	48.3	340	40.2	183	41.9	157	38.5
1910-13	991	100.0	518	52.3	473	47.7	412	41.6	218	42.1	194	41.0
1915-18	1,154	100.0	588	51.0	566	49.0	424	36.7	227	38.6	197	34.8
1920-33	4,512	100.0	2,223	49.3	2,289	50.7	1,565	34.7	742	33.4	823	36.0
1920-23	1,346	100.0	679	50.4	667	49.6	439	32.6	213	31.4	226	33.9
1925-28	1,519	100.0	746	49.1	773	50.9	516	34.0	255	34.2	261	33.8
1930-33	1,647	100.0	798	48.5	849	51.5	610	37.0	274	34.3	336	39.6
1935-48	6,631	100.0	3,184	48.0	3,447	52.0	2,103	31.7	963	30.2	1,140	33.1
1935-38	1,901	100.0	926	48.7	975	51.3	621	32.7	268	28.9	353	36.2
1940-43	2,214	100.0	1,070	48.3	1,144	51.7	677	30.6	307	28.7	370	32.3
1945-48	2,516	100.0	1,188	47.2	1,328	52.8	805	32.0	388	32.6	417	31.4

¹ The percentages given for each sex at all ages are based upon the total population. The percentages given for the school-age population, both sexes, male, and female, are based upon the total population in each of these categories. In order to minimize the effects of possible variations due to the very small frequencies involved, I compiled a series of "synthetic" totals by summing the figures given into 4-year groups. The first of these groups is the sum of the frequencies reported for the years 1880, 1881, 1882, and 1883. The second group is the sum of the values given for the years 1885, 1886, 1887, and 1888, etc. The totals shown for the longer time-spans are merely the sum of their component 4-year groupings. The average Ramah population during any one of these 4-year periods would approximate one-fourth of the figures given in this table for that period.

² Lonergan, MS. a.

³ Lonergan, MS. b.

⁴ Crane, MS.

⁵ Balmer, MS. a.

⁶ The data on the Ramah Navaho community were supplied by Dr. David F. Aberle, of the University of Oregon, with the kind permission of the late Prof. Clyde Kluckhohn of Harvard University. The data were compiled from photostats, in the possession of Dr. Aberle, showing single-year distributions, by sex, for the Ramah Navaho as of January 1 of each year from 1880 to 1948.

⁴⁸ From an unpublished report on "Navajo Population" in the files of Robert W. Young, assistant to the general superintendent of the Navajo Agency at Window Rock. This high figure was recognized as an overestimate, and was evidently calculated to illustrate the range of population estimates that could be derived from different assumptions regarding the number and proportion of school-age Navahos.

ration book count of children aged 6 to 18, inclusive, was made in the Tuba City School District, comprising land management districts 1, 2, and 3. The resultant total was divided by the total population of these districts as reported in the preliminary tabulations (unpublished) of the 1940 census. This computation produced a proportion of 42.8 percent. On the basis of these data, the Navajo Agency officials adopted the figure 40 percent as the proportion of the total Navaho population that could be assumed to be of school age.⁴⁹

It is, of course, apparent from all existing age distributions for the Navaho that the Navaho population is considerably younger than that of the general population of the United States, so that the figure of 26 percent is far too low. On the other hand, the figure of 40 percent would appear to be almost equally in error in the opposite direction.

TABLE 20.—*Sample data from the enrolled Navaho population—1939*¹

Subagency	All ages						School age (6-18 years)					
	Both sexes		Male		Female		Both sexes		Male		Female	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
Total Navaho: ²												
Unadjusted data ³ -----	5,248	100.0	2,684	51.1	2,564	48.9	1,803	34.4	936	34.9	867	33.8
Adjusted data ³ -----	5,528	100.0	2,815	50.9	2,713	49.1	1,873	33.9	961	34.1	912	33.6
Western Navajo:												
Unadjusted data ³ -----	581	100.0	302	52.0	279	48.0	218	37.5	123	40.7	95	34.0
Adjusted data ³ -----	613	100.0	313	51.0	300	49.0	225	36.7	126	40.2	99	33.0
Leupp Navaho:												
Unadjusted data ³ -----	294	100.0	157	53.4	137	46.6	110	37.4	62	39.5	48	35.0
Adjusted data ³ -----	304	100.0	162	53.3	142	46.7	110	36.2	62	38.3	48	33.8
Hopi:												
Unadjusted data ³ -----	436	100.0	229	52.5	207	47.5	175	40.1	96	41.9	79	38.2
Adjusted data ³ -----	450	100.0	241	53.6	209	46.4	181	40.2	101	41.9	80	38.3
Southern Navajo (Arizona):												
Unadjusted data ³ -----	1,465	100.0	755	51.5	710	48.5	442	30.2	222	29.4	220	31.0
Adjusted data ³ -----	1,544	100.0	786	50.9	758	49.1	465	30.1	230	29.3	235	31.0
Southern Navajo (New Mexico):												
Unadjusted data ³ -----	568	100.0	299	52.6	269	47.4	191	33.6	107	35.8	84	31.2
Adjusted data ³ -----	592	100.0	311	52.5	281	47.5	193	32.6	107	34.4	86	30.6
Eastern Navajo:												
Unadjusted data ³ -----	911	100.0	411	45.1	500	54.9	323	35.4	138	33.6	185	37.0
Adjusted data ³ -----	957	100.0	434	45.3	523	54.7	333	34.8	141	32.5	192	36.7
Northern Navajo:												
Unadjusted data ³ -----	993	100.0	531	53.5	462	46.5	344	34.6	188	35.4	156	33.8
Adjusted data ³ -----	1,068	100.0	568	53.2	500	46.8	366	34.3	194	34.2	172	34.4

¹ The data shown in this table were transcribed by me during the summer of 1957 directly from the rolls on file at the Navajo Agency census office at Window Rock, Ariz., with the permission and cooperation of Robert W. Young, assistant to the superintendent of the Navajo Agency, and Wilbur Morgan, supervisor of the census office. There are seven rolls in all, one for each of the subagencies listed. A sample was obtained from each roll by selecting every 10th page, starting with a randomly selected number between 1 and 10. The age and sex of each individual person listed on a sample page, and of each member of a family whose head was listed on a sample page, was recorded. This procedure provided data on a sample of approximately 10 percent.

² "Total Navaho" is the sum of the sample totals from the seven subagencies. It is approximately equal to 10 percent of the actual number of persons on the roll.

³ In order to estimate the adequacy of these rolls as sources of information on the population of the Navaho, two sets of data were compiled. The "Unadjusted" set includes only persons who were listed on the 1939 roll. This list comprises persons enumerated in the original survey of 1928-29, plus reported births in the period from 1929 to 1939, minus reported deaths occurring in the same period. The "Adjusted" set comprises persons in the first set plus persons who were added to the rolls after 1939 and whose dates of birth indicated that they were alive in 1939. The differences between these two sets of data are therefore a partial indication of the incompleteness of both the original survey in 1928-29 and of the registration of births in the decade following 1929.

⁴⁹ Ibid., p. 3. The latter estimate implied a total population of about 61,000 at this time, which is about 25 percent lower than the high estimate of 82,000.

In the first place, the percentage of 40.6 as quoted above referred explicitly to the age group 5 to 19, inclusive. Even the crudest adjustments of these data to obtain the proportion aged 6 to 18 would suggest a percentage of about 35 rather than 40. Secondly, the calculations made from the data for the Tuba City School District are themselves subject to considerable bias, since the total population pertained to the census date of April 1, 1940, whereas the count of children aged 6 to 18 was derived from ration books that were issued, for the most part, during the years 1943 and 1944. Thus the resultant percentage takes no account of the population increase that occurred in the area in the 3- or 4-year interval between the 1940 census and the issuance of the ration books.

The issuance of a series of ration books to the Navahos in the reservation area during World War II provided the officials of the agency with an additional source of population data (table 21).⁵⁰ In interpreting the figures obtained from this source, three considerations are especially pertinent.

(1) The issuance of ration books would certainly motivate widespread public cooperation, and thus promote a relatively complete count of the population. By the same token, however, there would exist a considerable motivation toward duplicate registration and/or claims of fictitious dependents and the like. It is, of course, impossible to ascertain to what extent these factors might have been operative among the Navaho at this time, but the resultant figures should be viewed with extreme caution.

(2) The figures given for the number of Navahos in military service, and especially for the number of Navahos working and living away from the Navaho administration area, are estimates. The estimates of the latter group are especially subject to error.

TABLE 21.—*Total Navaho population as estimated from a count of ration books issued in the Navaho administrative area—1943-44*¹

Ration book number and date of issue	Total number of books issued	Number of book issued to Whites in the area	Estimated number of Navahos in military service	Estimated number of Navahos working off the reservation	Estimated total Navaho population ²
Book No. 2: (February 1943)-----	50,982	2,402	2,000	7,000	57,580
Book No. 3: (October 1943)-----	53,624	³ 2,400	2,500	7,500	61,224
Book No. 4: (October 1944)-----	50,271	2,521	3,000	12,000	62,750

¹ Bureau of Indian Affairs, 1947.

² This estimated total is the sum of the first, third, and fourth columns, minus the second column.

³ The number of Whites who received Ration Book No. 3 in October 1943 was not reported. Their number is estimated by me as 2,400 for purposes of comparison in the table.

⁵⁰ The counts based on the issuance of these ration books are summarized briefly in Bureau of Indian Affairs, 1947, p. 6.

(3) Although some effort was made to separate the ration books issued to Whites residing in the area, there remains the possibility that some Hopis or other non-Navaho Indians might have been included in the counts obtained, or, conversely, that some Navahos might have received issues of ration books within the Hopi Agency area.

The Navajo Agency officials themselves fully recognized these inherent limitations when they merely concluded that the Navaho population was "in excess of 60,000" at this time.⁵¹

It is evident that the population records maintained by the Navajo Agency have undergone considerable improvement during this last period. For the first time, agency officials have been able to utilize a number of independent records to arrive at plausible estimates of the total population within their administrative area. Although the assumptions underlying some of these estimates and the techniques employed are open to question, the general trend has been toward the development of a fairly adequate conception of the total population residing in the Navaho administrative area.

However, these records are still characterized by the persistence of a number of important defects and limitations of coverage. The basic source of information, the Navajo Agency census rolls, are now seriously out of date. No reservationwide enumerative survey has been conducted since the preparation of these rolls in 1928-29, so that all of the revisions that have been made on these rolls are based ultimately upon the voluntary registration of individual Navahos who present themselves at the census office at Window Rock, and the admittedly deficient reports of Navaho births, deaths, and migration. Despite the laudable diligence of the staff of the census office, there can be little doubt that the rolls that are still in use stand in need of major revision based upon an actual census type field survey throughout the Navaho administrative area.⁵²

Secondly, there remains the growing problem of maintaining adequate records on the fluctuating numbers of Navahos who are moving off the reservation and establishing permanent or temporary residences away from the Navaho administrative area. In theory, it can be argued that these individuals would make every effort to retain their contact with the reservation, in view of the anticipated and actual benefits to be derived from membership in the Navaho tribe. In practice, however, many of these persons may become sufficiently absorbed, both socially and psychologically, in the general population as to lose their identities as Navahos. In particular, births and deaths occurring among the permanent off-reservation Navaho population

⁵¹ This conclusion was supported, incidentally, by an estimate made of the number of enrolled Navahos in 1947. The estimate was made by Howard Johnson, of the Navajo Agency staff, who arrived at a figure of 61,051 (Bureau of Indian Affairs, 1947, p. 6).

⁵² Some of the more recent efforts at improving these rolls are described on pp. 180-185.

may not be adequately or completely reported to the Navajo Agency census office.

Thirdly, the task of properly identifying individual Navahos, either for purposes of listing them with the appropriate family group, or for purposes of record checks and other verifications, remains extremely difficult. In addition to the difficulties of transcribing Navaho names by means of the English alphabet, there is the persistent practice whereby individual Navahos are known by a plurality of names, thus greatly increasing the possibility of duplicate entries and errors in classification.

Finally, the plethora of administrative records now available to the officials of the Navajo Agency has apparently created a curious situation wherein any given population estimate can immediately be countered by a number of alternative and equally plausible estimates derived from other sources. In the absence of any up-to-date enumeration of the entire population of the area, no single population estimate can be said to enjoy completely authoritative support.

By way of summary, it must be concluded that the fundamental defect that is inherent in all of the population records presently available to the officials of the Navajo Agency is the lack of an adequate, recent field survey designed to obtain demographic information on the population of the Navaho. None of the administrative records presently maintained have been designed to provide demographic information on the population as a whole, however adequate they may be in other respects.⁵³

THE BUREAU OF THE CENSUS⁵⁴

The first enumeration of the entire Indian population of the United States was undertaken by the Bureau of the Census as a part of its decennial census in 1890.⁵⁵ The three censuses preceding that of 1890 provided separate tabulations of the Indian population living "outside of tribal relations," but these censuses did not cover the overwhelming majority of Indians who were still living in various

⁵³ My recommendations in regard to the establishment of a system of population registration supplemented by periodic surveys on an area-sample basis are detailed on pp. 185-188.

⁵⁴ The Bureau of the Census was a subdivision of the Department of the Interior until Feb. 14, 1903, when it was transferred to the Department of Commerce and Labor. When, in 1913, the Department of Commerce became a separate entity, the Bureau of the Census became a permanent bureau of the Department of Commerce. For bibliographic purposes, all references to census data are listed under "Bureau of the Census" rather than "Department of the Interior," "Department of Commerce and Labor," or "Department of Commerce."

⁵⁵ Bureau of the Census, 1894. It should be noted, however, that the census of 1850 did incorporate the results of the unique Schoolcraft (1854) report on the Indian tribes of the United States. This report provided estimates of the Indian population of tribes in the Eastern United States for 1789, 1825, and 1853. The tribes in the Southwest were estimated as of 1853 only. Part IV contains reports on the Navaho tribe by Maj. E. Backus and Lt. Col. J. H. Easton. The former report was relatively objective, while the latter was essentially antagonistic to the Navaho.

forms of tribal organizations either on reservations or in Indian territory.

Before the census of 1860, even those Indians who were living among the general population of the United States were not tabulated separately, but were instead presumably included in the category "free colored."⁵⁶ The omission of "tribal" Indians from the pre-1890 decennial censuses was officially justified on the grounds that these persons did not possess legal status either as citizens or as residents of the United States, insofar as the apportionment of representatives among the several States was concerned. The census report on the Indian population of the United States in 1930 includes the following statement on this point:

PREVIOUS ENUMERATIONS OF INDIANS.—The Census of 1860 was the first in which Indians were distinguished from other classes in the population, but no enumeration was made of Indians in Indian Territory or on reservations until 1890. This omission was probably due to the fact that the constitutional provision for the apportionment of representatives in Congress, which was the immediate reason for taking the early censuses, specifically excluded "Indians not taxed." [Bureau of the Census, 1937, p. 2.]

Most of the census reports prior to 1890 contain summary statistics pertaining to the Indian population of the United States. However, since these figures were obtained from the annual reports of the Commissioner of Indian Affairs, the census of 1890 provides the first independent source of information on the Indian population supplied by the census office.

The earliest reference to Indians in the Territory of New Mexico (roughly comprising the present States of Arizona and New Mexico) appears in the 1850 census report. The estimate quoted therein, as provided by the Commissioner of Indian Affairs, was 45,000 (Bureau of the Census, 1853, p. xciv). The enumerated population of the territory at this time was reported as 61,525 Whites and 22 free colored (Bureau of the Census, 1853, p. 998; 1854, p. 191). Since no information was provided on the tribal composition of the Indians in the territory, it is impossible to judge what proportion of this estimated Indian population might have been Navaho.

In the census of 1860, a total of only 10,452 Indians were enumerated in the Territory of New Mexico. Although once again, their tribal composition was not indicated, it can be surmised that these Indians were individuals living among the general population, either as servants or peons living with individual families, or in small groups

⁵⁶ The schedule of the first decennial census of the United States in 1790 classified the enumerated population into the following four categories: Free White males, free White females, all other free persons, and slaves. The censuses of 1810 and 1820 added the qualification that the category "All other free persons" excluded Indians not taxed. The censuses of 1820, 1830, and 1840 presented data on Whites, free colored, and slaves, by sex. The census of 1850 presented data on free Whites, free blacks, free mulattoes, and slaves, by sex. From Bureau of the Census, 1853, pp. x-xii.

on the outskirts of established communities. Some of the more accessible Pueblo communities may also have been included in these figures, but this remains conjectural. This census report also provided an estimate of the number of Indians in the territory who were "not enumerated and who are retaining their tribal character." The figure given for this group was 55,100, which implies a total estimated Indian population of 65,552 in the territory at this time (Bureau of the Census, 1864, pp. 566, 605).

In the census of 1870, the number of Indians enumerated in Arizona and New Mexico was drastically reduced from the 10,452 reported in 1860 to 1,340, including 31 in Arizona and 1,309 in New Mexico (Bureau of the Census, 1872, p. 7). In the census of 1880, on the other hand, the number of Indians enumerated in Arizona rose to 3,493, while those in New Mexico numbered 9,772, for a total of 13,265 (Bureau of the Census, 1882, table iv, p. 379).

The apparent fluctuations between the censuses of 1860 and 1880 can probably be attributed in large part to the ambiguity of the instructions regarding the enumeration of off-reservation Indians. This ambiguity, in turn, stems partially from the difficulties inherent in the concept of "Indians not taxed" and "Indians taxed" whereby the former group was to be excluded from the census while the latter group was to be included. Since many off-reservation Indians were in a condition of pauperism, their inclusion or exclusion was probably a matter of local preference.

The position adopted by the census office at this time, together with the difficulties inherent in the concept of "Indians taxed" and "Indians not taxed" is clearly set forth in the introductory text (p. xii) of the 1870 census report:

INDIANS TAXED.—In the absense of any constitutional, legal, or judicial definition of the phrase "Indians not taxed," as found in the Constitution and in the census law of 1850, it has been held for census purposes to apply only to Indians maintaining their tribal relations and living upon Government reservations.

The broken bands and the scattered remnants of tribes still to be found in many States of the Union, though generally in a condition of pauperism, have been included in the enumeration of the people. By the fact of breaking away from their tribal relations they are regarded as having entered the body of citizens, and as subject to taxation from the point of view of the Constitution, although they may be exempted actually from taxation by local legislation or by the accident of pauperism. It has been held that it was not necessary that a member of this race should be proved to have actually paid taxes, in order to take him out of the class "Indians not taxed," but only that he should be found in a position, so far as the authorities or agents of the census can know, to be taxed were he in possession of property. His pauperism has been regarded as an individual accident, which cannot possibly affect his constitutional relations. . . . The provisions of the Constitution in regard to the enumeration of Indians, being invidious and opposed to the general spirit of that instrument, and even more emphatically opposed to the spirit of recent legislation and of the late constitutional amendments, should be construed strictly and not liberally.

It is evident from the figures quoted previously, however, that the overwhelming majority of the Indians in Arizona and New Mexico were excluded from the enumeration of 1870, despite the tenor evident in the above quotation.

The instructions regarding the enumeration of Indians in the 1880 census reflect an effort toward giving the concept of "Indians not taxed" some degree of operational significance:

By the phrase "Indians not taxed" is meant Indians living on reservations under the care of Government agents, or roaming individually, or in bands, over unsettled tracts of country.

Indians not in tribal relations, whether full-bloods or half-breeds, who are found mingled with the white population, residing in white families, engaged as servants or laborers, or living in huts or wigwams on the outskirts of towns or settlements are to be regarded as a part of the ordinary population of the country for the constitutional purposes of the apportionment of Representatives among the States, and are to be embraced in the enumeration. [Wright, 1900, p. 168.]

With regard to the population of the Navaho Indians, the implications of the above instructions and interpretations are readily apparent. Except for a few scattered individuals, the Navaho did not come under the purview of any of the enumerations conducted prior to 1890, and their number must therefore remain an indeterminate fraction of the crude estimates of the total Indian population of the Territory of New Mexico that are reported in their earlier censuses. Those Indians which were enumerated in this territory before 1890 are likely to have been Eastern Pueblo, Zuni, or scattered remnants of Apache bands.

The first special enumeration of the total Indian population of the United States, carried out in 1890, did not involve any change in the official status of the Indians themselves. The Indian population which was enumerated was again classified into the two categories of "Indians not taxed" and "Indians taxed." The operational definitions given to these concepts were substantially the same in 1890 as in 1880 (*ibid.*, pp. 181-182).

In order to minimize the possibility of duplicate counts or omissions, Indians living on reservations were enumerated by special agents appointed directly by the Office of the Superintendent of the Census, while those living off reservations were covered by the regular census enumerators. The special agents appointed to cover the reservations were, for the most part, staff members of the several Indian agencies or individuals residing on or near the respective reservations.

In anticipation of the difficulties engendered by the need to dichotomize the Indian population into the categories "taxed" and "not taxed," the following instructions were added:

... When enumerators find Indians off or living away from reservations, and in no wise dependent upon the agency or Government, such Indians, in addition to their enumeration on the population and supplemental schedules in the same manner as for the population generally, should be noted on a special schedule [7-917] by name, tribe, sex, age, occupation, and whether taxed or not taxed.

The object of this is to obtain an accurate census of all Indians living within the jurisdiction of the United States and to prevent double enumeration of certain Indians.

Where Indians are temporarily absent from their reservations the census enumerators need not note them, as the special enumerator for the Indian reservation will get their names. [Ibid.]

Because of their bearing on contemporary problems of Indian enumeration, these instructions merit additional comment. The first point to be noted is that the regular enumerators were expected to determine whether an Indian found off a given reservation was actually a member of that reservation, or was living independently of its agency or government. If the enumerator determined that the Indian was only away from the reservation temporarily, he was supposed to leave his enumeration to the special agent of the reservation concerned, without recording the contact he had made with the individual in question. This procedure did not permit verification of the information obtained by these special agents in regard to persons reported to be away from the reservations temporarily. To the extent that such persons were inadvertently or otherwise omitted from mention by their family members on the reservation, they were likely to be omitted entirely from the enumeration.

The converse situation was, in theory, adequately provided for. If an enumerator determined that an Indian was living off the reservation and independent of its agency or government, he was to record the pertinent information both on his regular census schedule and on a special supplementary schedule for Indians. By matching these supplementary schedules against the schedules in use on the appropriate reservation, it would be possible to omit duplicate entries. However, there is no evidence that such a matching procedure was undertaken in any systematic fashion. It need hardly be added that the cost of such a matching procedure would have exceeded by far the budgetary limitations within which all of these censuses were undertaken.

In actual practice, therefore, there remains the possibility that, on the one hand, temporary absentees from the reservation were missed entirely, while on the other hand, persons who were "permanently" away might have been enumerated twice. It can be argued that under the patterns of settlement that prevailed among both on-reservation and off-reservation Indians at this time, both groups were likely to have been underenumerated, so that despite the possible

duplications, the overall bias would be in the direction of under-enumeration. However, the extent of this bias cannot be determined.

When one considers the possible relevance of the above problems to the situation of the Navaho Indians, the enumeration of the Navaho in 1890 must be regarded, *a priori*, as particularly unsatisfactory. The question of "permanent" residence was always especially complex when viewed in the context of typical Navaho patterns of land use, and there is considerable evidence to indicate that the Navaho were increasingly mobile at this time. The decade of the 1880's had witnessed an unprecedented increase in their stock holdings, so that Navaho outfits and smaller groups were forced to range farther afield in search of water and pasturage. In general, the dichotomy of "on-reservation" and "off-reservation" was particularly inapplicable in the case of the Navaho, many of whom moved freely across reservation boundaries.

It is apparent also that the personnel assigned to carry out the enumeration were entirely insufficient. A single agent, D. L. Shipley, was given the task of carrying out the enumeration of the entire Navajo Reservation. He apparently conducted this task with the assistance of four or five persons, and did not complete his enumeration until August, 1891, over a year after the beginning of the census. As was the case with earlier surveys, Shipley's enumeration was relatively complete in the area immediately surrounding Fort Defiance, but the available figures suggest that his coverage of the population in the farther reaches of the reservation was progressively inadequate with the increasing distance from the agency headquarters. In this connection, it should be noted that large portions of the western and southern parts of the present Navajo Reservation were not yet annexed, although many Navahos were in fact residing, either temporarily or permanently, in these areas at this time. Furthermore, most of the northern part of the present reservation did not become a part of the official reservation area until 1884, so that the agent in charge of the 1890 enumeration did not possess reliable knowledge of the settlement patterns in this area. See map 3 (p. 24) for an outline of the area in question.

The available records of the 1890 Navaho census do not specify the precise nature of the difficulties encountered, but apparently these difficulties included some errors in the delineation of enumeration districts. One of the few critical references I found states simply that the enumeration was "taken on a faulty system" (Hodge, 1910, pp. 41-45).

A comparison of the summary population figures for the Navaho at this time reveals the magnitude of the possible error in the 1890 census. In table 22, the official results of the 1890 census are shown,

together with the data submitted by the special agent for the Navajo Reservation proper, and the recapitulation of the first Navaho tribal roll prepared in 1885.

TABLE 22.—*Reported Navaho population, all ages and school age, by sex and residence—1885, 1888, and 1890*¹

Residence and date	All ages						School age		Source
	Both sexes		Males		Females		Num-ber	Per-cent	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent			
Total Navaho population:									
1885.....	21, 003	100. 0	—	—	—	—	—	—	Aycock, MS.
1888.....	18, 000	100. 0	8, 500	47. 2	9, 500	52. 8	—	—	Bureau of Indian Affairs, 1889, p. 189
1890.....	14, 500	100. 0	—	—	—	—	—	—	Bureau of Indian Affairs, 1890, p. 161.
1890.....	17, 204	100. 0	8, 533	49. 6	8, 671	50. 4	5, 621	32. 7	Bureau of the Census, 1894, pp. 102 f.
Navaho population on reservation:									
1885.....	13, 003	100. 0	6, 280	48. 3	6, 723	51. 7	6, 404	49. 2	Aycock, MS.
1890.....	16, 102	100. 0	—	—	—	—	3, 200	19. 9	Shipley, MS.
Navaho population off reservation:									
1885.....	8, 000	100. 0	—	—	—	—	—	—	Aycock, MS.

¹ All percentages are based upon the total population from the source specified. The age group included in the category "school age" was not specified.

The figures shown do not permit close comparison because of the temporal range of the data reported and the lack of specification regarding the areas covered in the respective enumerations. Nevertheless, two outstanding discrepancies are apparent. Comparing the 1890 Navajo Agency report with that of the 1890 census, we find a total on-reservation population of 16,102 and a total enumerated population of 17,204. This would imply an 1890 off-reservation population of about 1,100 Navahos. By contrast, the agency report of 1885 gives a total enrolled population of 13,003, but adds an estimated 8,000 off-reservation Navahos, for a grand total of 21,003. Even if this latter estimate is far too high, the figures reported in the years immediately preceding the 1890 census suggest that this census was not complete in its coverage.

The second major discrepancy to be noted in the figures given in table 22 pertains to the reported numbers of children of school age. The 1885 roll gave a total of 6,404 children of school age, which is 49.2 percent of the total enrolled population. The 1890 agency report, on the other hand, gave a total of only 3,200 children of school age, or 19.9 percent of the total reported population. The 1890 census, finally, reported a total of 5,621 children of school age, or 32.7 percent of the total enumerated population.

The several available age distributions of the Navaho population suggest that the proportion of the population that is of school age is

about 34 percent. Thus, even allowing for some variation in the age groups which comprise the school-age population, it is apparent that only the 1890 census produced plausible figures in this regard. This finding has one important implication: While the 1890 census may have been deficient in coverage, it seems to have produced somewhat more adequate information on the characteristics of the population enumerated.

Only a small proportion of the 1890 census of Indians was devoted to the presentation of statistical tabulations. The bulk of the report consisted of summary accounts of the past history and current condition of the several tribes. For the most part, these descriptions were prepared and submitted by the respective Indian agents or agency superintendents. The report on the Navajo Agency does not provide clues as to the completeness of the 1890 enumeration, but it does refer to "many settlements of Navajos" which were located off the reservation in a wide area extending from the banks of the Colorado and Little Colorado Rivers to the west, the San Francisco and Sunset Mountains to the southwest and south, and in scattered localities east and southeast of the reservation.⁵⁷ However, the total population of these widespread Navaho groups, and the extent to which they were included in the 1890 enumeration, cannot be determined from the evidence at hand.

In a brief but careful review of the figures reported on the basis of this 1890 census, Frederick L. Hoffman (1929, p. 655) asserts that the reported total of 17,204 Navahos in 1890 included some Indians who were not Navahos, "... the facts not being accurately indicated." Thus, in addition to the problem of incomplete coverage, there arises the question of the number of non-Navahos who may have been erroneously classified as Navahos in this census.

It must be concluded that the results of the 1890 census, insofar as the enumeration of the Navaho Indians is concerned, are not materially superior to the estimates developed by the agents at this time. However, the population characteristics that were recorded in connection with the 1890 enumeration appear to have been relatively reliable.

The second special census of the Indian population of the United States took place in 1910, after an interval of 20 years (Bureau of the Census, 1915). As in 1890, the 1910 Indian census was conducted for the most part by employees of the Bureau (then Office) of Indian Affairs. These employees, together with other non-Indians residing on or near the several reservations, were again appointed as special agents by the superintendent of the Office of the Census and charged with the

⁵⁷ From Bureau of the Census, 1894, p. 157. In regard to the large discrepancies in the numbers of school-age Navahos reported during this period, it should be noted that the figures based on the 1885 roll, the 1890 agency report, and the 1890 census were arrived at independently, with no apparent effort at reconciliation.

responsibility of carrying out the enumeration in their respective reservation areas.

In order to obtain information on certain characteristics of particular significance to the Indian population, a special schedule (Form MM 3-397) was again prepared. In addition to the 32 items of information requested from the general population of the United States, this Indian schedule contained 14 additional items. A brief summary of the content of the more pertinent of these items reveals the scope of the decennial census in its coverage of the Indian population at this time. Among the items on the regular schedule were questions relating to the respondent's ability to speak English, or, if unable to do so, what language was spoken; the person's occupation and industry; and whether the person was able to read, write, or was currently attending school. The enumerators were instructed to enter "Ration Indian" in the space provided for the respondent's occupation and industry if the Indian in question had no occupation and was wholly dependent upon the Government for support. If this dependency was apparently partial, the enumerator was instructed to enter the letter "R" beside the person's reported occupation and industry.

The 14 additional items also were designed to determine the individual's tribal affiliation; that of his father and of his mother; his proportions of White, Indian, and Negro blood; the number of times the Indian had been married; whether he was living in polygyny at the time of the census, and if so, whether his wives were sisters (sororal polygyny). Finally, the Indian schedule included inquiries concerning what educational institution, if any, the individual had attended and from which he was graduated; whether the individual was taxed; whether he had received an allotment of land; whether he was residing on his own lands; and whether he was living in a "civilized" or an "aboriginal" dwelling.

It is evident that the 1910 enumeration was designed to furnish a remarkably comprehensive description of the socioeconomic condition of the Indians, and the degree to which they had been acculturated through contacts with the general society of the nation.

The general population totals for the Navaho, as returned in this census, are shown in table 23 together with the figures submitted to the Commissioner of Indian Affairs by the Navajo Agency in 1910 and 1911. Examination of these figures indicates that the proper discrepancy in the total given is to be found in the figures for Arizona, where the 1910 census returned a total of 11,001 Navahos, while the corresponding number given by the Navajo Agency was 18,150. Dr. Roland B. Dixon, who, together with Dr. F. A. MacKenzie, directed the tabulation and analysis of the results of the 1910 Indian enumeration, ex-

pressed the view that the census figure was too low, while that of the Bureau of Indian Affairs was too high. Dr. Dixon's statement (1915, pp. 78-79) was as follows:⁵⁸

The enumeration of the Navajo is of necessity somewhat uncertain, owing to the local conditions. The tribe is a nomadic one, roaming over a very large extent of country, so that an absolutely accurate enumeration would be an extremely difficult, if not impossible task. Comparison, therefore, with returns of even greater uncertainty (since founded almost wholly on estimates) made in the reports of the Commissioner of Indian Affairs are of little real value The discrepancy between this figure of about 28,000, which has been returned in the reports of the Commissioner of Indian Affairs with little variation since 1905, and that of 22,455, obtained by the present census, is large. That 28,000 is a figure somewhat too large and that the enumeration of the census is too small seems probable. An exact enumeration, however, is, as already stated, practically impossible.

TABLE 23.—*Reported Navaho population by sex and State of residence—1910-11*

State	Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
Total Navaho:						
1910 ¹ -----	22,455	100.0	11,346	50.5	11,109	49.5
1910 ² -----	26,624	100.0	(3)		(3)	
1911 ⁴ -----	30,006	100.0	15,048	50.2	14,958	49.8
Arizona:						
1910 ¹ -----	11,001	100.0	5,622	51.1	5,379	48.9
1910 ² -----	18,150	100.0	(3)		(3)	
1911 ⁴ -----	19,125	100.0	9,678	50.6	9,447	49.4
New Mexico:						
1910 ¹ -----	10,354	100.0	5,123	49.5	5,231	50.5
1910 ² -----	8,474	100.0	(3)		(3)	
1911 ⁴ -----	10,881	100.0	5,370	49.4	5,511	50.6
Utah:						
1910 ¹ -----	1,039	100.0	552	53.1	487	46.9
1910 ⁵ -----						
1911 ⁵ -----						
Other States:						
1910 ¹ -----	61	100.0	49	(6)	12	(6)
1910 ⁵ -----						
1911 ⁵ -----						

¹ Bureau of the Census, 1915, table 30.

² Bureau of Indian Affairs, 1910, table 7. These figures were originally labeled as estimates.

³ Data not available.

⁴ Bureau of Indian Affairs, 1911, table 2. These figures were originally labeled as estimates.

⁵ Navahos residing in Utah were generally included in the statistics for Arizona, while Navahos residing in other States were not included by the Navaho agencies reporting at this time.

⁶ Numbers too small to warrant computation of percentages.

Without assuming the accuracy of either of the 1910 figures for the Navaho population in Arizona, it is possible to infer that the 1910 census of Navaho Indians was relatively complete in its coverage of the New Mexico portion of the reservation, but that it was seriously deficient in its coverage of the northern and western reaches of the reservation area. Dr. Hoffman's article sheds some additional light on

⁵⁸ Dr. Dixon himself noted the inexplicable variations in the year-to-year estimates of Navaho population as reported by the agents to the Bureau of Indian Affairs, making reference to "a sudden rise" to over 20,000 in 1894, and "a still greater rise" from 21,379 in 1905 to 28,544 in 1906.

this matter. Hoffman (1929, p. 655) reports that the 1890 census reported 11,042 Navahos on the Arizona portions of the Navajo Reservation. Even if this figure included some Hopis or Paiutes (as Hoffman implied), the fact that only 11,001 Navahos were enumerated in this area 20 years later suggests that the latter figure was derived from a deficient coverage. This view was also expressed by Father Anselm Weber, who participated in the 1910 enumeration and was generally acknowledged to be one of the outstanding authorities on Navaho population.⁵⁹

It is apparent, therefore, that although the 1910 Indian census did provide a wealth of information on the characteristics of the Navaho population, it did not adequately solve the problem of coverage which had limited the census of 1890.

The third special census of the Indian population of the United States was carried out in connection with the 1930 decennial census. In its general organization and operation, this Indian enumeration appears to have overcome some of the difficulties which attended the two earlier efforts of the Bureau of the Census. In the first place, the 1930 Indian enumeration was more fully integrated with the general population census conducted at this time. The same schedule that was designed for the regular enumeration of the population was used in enumerating Indians, except that when an enumerator encountered an Indian, he was instructed to ask that person's tribal affiliation and degree of Indian blood. This information was recorded on the regular schedule in the spaces allotted for recording the birthplace of each respondent's father and mother.⁶⁰

Of greater significance by far, however, was the fact that the major burden of the actual enumeration was shifted from the regular employees of the Bureau of Indian Affairs to the much larger staff of special enumerators employed by the Bureau of the Census. As a result of this change in organizational procedure, the personnel of the former Bureau were utilized largely in the preparatory phases of the census, and in supervising the actual enumeration, while the actual census was carried out, for the most part, by enumerators who were especially recruited and trained for the purpose.

The instructions to the enumerators who conducted the 1930 Indian census included a special precaution in regard to the problem of properly identifying Indians in the Southwestern States. The pertinent instructions were as follows:

⁵⁹ Weber, 1914, p. 3. Father Weber's statement in this regard is brief and blunt: ". . . According to the census of 1910 the Navajo tribe numbers 22,455 people. To my own personal knowledge a large number of Navajos were not enumerated in that census."

⁶⁰ From the files of Dr. Henry D. Sheldon, chief, Demographic Statistics Branch, Population Division, Bureau of the Census. Memorandum dated Aug. 22, 1949.

The enumerators in the Fifteenth Census were instructed to return as Indians, not only those of full Indian blood, but also those of mixed white and Indian blood, "except where the percentage of Indian blood is very small," or where the individual was "regarded as a white person in the community where he lives." The published instructions further specify that: "A person of mixed Indian and Negro blood should be returned as a Negro unless the Indian blood predominates and the status as an Indian is generally accepted in the community." Supplementary instructions in regard to the Indian enumeration also contained the following provision: "In New Mexico, Arizona, and California, enumerators should take special care to differentiate between Mexican laborers and Indians. Some Mexican laborers may endeavor to pass themselves as Indians. Persons residing in the region should have no difficulty in differentiating between the two types." [Bureau of the Census, 1937, p. 1.]

These instructions explicitly refer to a fundamental problem with respect to the enumeration of any ethnic group—the fact that membership in such group is not objectively determinable in marginal cases, so that the resultant figures reflect, and may possibly be distorted by, the attitudes and impressions of the individual enumerators.

The number of Navahos enumerated in the 1930 census, together with the figures reported by the Navajo Agency for neighboring years, are shown in table 24.

TABLE 24.—*Reported Navaho population, by sex and State of residence—1926–35*

State	Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
Total Navaho:						
1926 ¹ -----	33,185	100.0	16,703	50.3	16,482	49.7
1930 ² -----	39,064	100.0	19,776	50.6	19,288	49.4
1930 ³ -----	40,858	100.0	20,736	50.8	20,122	49.2
1934-35 ⁴ -----	43,555	100.0	22,270	51.1	21,285	48.9
Arizona:						
1926 ¹ -----	22,793	100.0	11,493	50.4	11,300	49.6
1930 ² -----	20,707	100.0	(⁵)-----		(⁵)-----	
1930 ³ -----	25,058	100.0	12,705	50.7	12,353	49.3
1934-35 ⁴ -----	21,424	100.0	11,028	51.5	10,396	48.5
New Mexico:						
1926 ¹ -----	10,392	100.0	5,210	50.1	5,182	49.9
1930 ² -----	16,971	100.0	(⁵)-----		(⁵)-----	
1930 ³ -----	15,800	100.0	8,031	50.8	7,769	49.2
1934-35 ⁴ -----	21,830	100.0	11,086	50.8	10,744	49.2
Utah:						
1926 ⁶ -----						
1930 ² -----	1,109	100.0	(⁵)-----		(⁵)-----	
1930 ⁶ -----						
1934-35 ⁴ -----	301	100.0	156	51.8	145	48.2
Other States:						
1926 ⁶ -----						
1930 ² -----	277	100.0	(⁵)-----		(⁵)-----	
1930 ⁶ -----						
1934-35 ⁶ -----						

¹ Bureau of Indian Affairs, 1927, tables 1 and 2.

² Bureau of the Census, 1937, tables 9 and 21.

³ U. S. Department of the Interior, 1931, table 2. The figures include six persons whose sex was not reported. Four in Arizona and two in New Mexico. These persons were divided equally between the sexes in each State.

⁴ Bureau of Indian Affairs, 1936, appendix table 2. This table gives the population as of Jan. 1, 1935.

⁵ Data not available.

⁶ Navahos residing in Utah were included with those reported in Arizona. Navahos residing in other States were not reported at this time.

It is at once apparent that the 1930 census figure is much closer to that of the Navajo Agency than was the case in 1910. In 1930, the agency figure was only 4.6 percent higher than the census figure, as compared to the excess of 18.6 percent in 1910. However, closer examination of these 1930 data reveals a number of perplexing discrepancies. In Arizona, the agency figure of 25,058 included Navahos residing in Utah, since the Utah portion of the reservation was included with the Western Navajo Agency at this time, and thus was reported under the totals for Arizona. Adding the census figures for Arizona, we find that the agency figure is 14.9 percent higher than the census figure. In New Mexico, by contrast, the agency figure is 6.9 percent below the census figure. Furthermore, the census reported a total of 277 Navahos residing in States other than Arizona, New Mexico, or Utah, whereas the agency reports make no reference to such persons.

A further question can be raised with regard to the number of Indians in the States of Arizona, New Mexico, and Utah whose tribal affiliation was not specified in the 1930 enumeration. If these persons are distributed among the several tribes in proportion to their own relative numbers, we obtain 637 additional Navahos in Arizona, 743 in New Mexico, and 62 in Utah, for a total of 1,442 "Navajos by allocation." Adding these to the census total of 39,064 produces a total Navaho population of 40,506, which figure is within 1 percent of the Navajo Agency figure.⁶¹

It should be stressed, however, that this close correspondence is largely fortuitous. A better indication of the possible errors in these statistics can be seen in the number of Navahos reported in Utah. The census reported 1,109 Navahos in Utah in 1930. The Navajo Agency, on the other hand, did not report the Utah Navahos separately until 1935, when it estimated their number as 301. Similar figures were reported by the Navajo Agency in 1940 (304) and again in 1945 (354). By contrast, the 1950 census report indicates 1,445 Navahos in Utah (Bureau of the Census, 1953).⁶² Thus, both the 1930 and the 1950 census figures for the Navaho population of Utah are greatly in excess of the Navajo Agency estimates made during the intervening years. Since both sets of figures purport to refer to residents, the difference between them can hardly be attributed to seasonal migration. Furthermore, the possibility that numbers of Utes or Paiutes were mistakenly classified as Navahos by the census enumerators in Utah

⁶¹ Bureau of the Census, 1937, p. 78. This allocation assumes that the proportion of Navahos among Indians of unspecified tribes is the same as the proportion of reported Navahos among Indians of specified tribes in the States of Arizona, New Mexico, and Utah.

⁶² Similar comparisons cannot readily be made from the returns of the 1960 census, since the total of 2,654 "Utah Navahos" reported in 1960 is actually the total number of Indians residing in San Juan County, Utah. Although most of the Indians in that county are probably Navahos, the Navajo Reservation covers only a small portion of that county. The 1960 data are from the Bureau of the Census, 1963 c, table 51.

cannot account for a difference of this magnitude, since only scattered remnants of the Ute and Paiute tribes remained in the vicinity of the Navajo Reservation in Utah at this time.

Despite these apparent limitations, it can be argued that the 1930 census produced more reliable statistics on the population of the Navaho than any enumeration conducted before or since that time. Three observations can be made in support of this view. First, the use of a larger number of regular census enumerators appears to have produced a more thorough coverage, on the whole, than could be realized by the more experienced, but numerically inadequate staff of the Navajo Agency. Secondly, the totals that were returned bear a relatively close correspondence with the estimates of the Navajo Agency despite the discrepancies discussed above. Finally, it should be noted that the number of Navahos who were in residence away from the reservation area at the time of the 1930 census was far smaller than in 1950 or subsequently, so that a much higher proportion of the Navaho population was to be found on the reservation itself, where the chances of mistaken identification would be somewhat lessened.

The most recent special enumeration of the Indian population of the United States was undertaken in connection with the 1950 census. In this census, however, special schedules were used only in selected Indian agency areas, so that a considerable proportion of the total Indian population of the country was not covered by the Indian enumeration. The Indian population returned on the special Indian schedules in 1950 numbered 246,766 or 72.1 percent of the total enumerated Indian population of 342,226.

The Navajo Agency area was among the 30 agency areas that were covered in the special Indian enumeration. Thus the 1950 census statistics on the population of the Navaho pertain to all Indians residing on the Navajo Reservation who reported their tribal affiliation as Navaho, plus Indians residing in off-reservation areas known to be occupied by Navahos.⁶³

The 1950 Indian Reservation Schedule (Form P-8) was designed to provide information on nine subjects in addition to those covered by the regular population and housing schedules. The items covered on the Indian reservation schedule were:

A. HOUSING DATA (*Observe and record*)

1. Type of house construction (check one)

- | | | |
|--------------------------------|--------------------------------|---|
| ☐ Frame | ☐ Log | ☐ Stone or brick |
| ☐ Tent | ☐ Brush | ☐ Mud or adobe |

Other (specify) _____

2. Type of floor construction (check one)

- | | | |
|--------------------------------|-------------------------------|--|
| ☐ Earth | ☐ Wood | ☐ Stone or cement |
|--------------------------------|-------------------------------|--|

Other (specify) _____

⁶³ The special schedule used in the selected Indian agency areas during the 1950 census (Form P-8) is described in Bureau of the Census, 1955, appendix A, pp. 85 and 98.

B. POPULATION CHARACTERISTICS

3. Is he known by any other name?

☐ None

or

Name _____

4. To what tribe does he belong?

5. To what clan does he belong?

6. Degree of Indian blood (check one)

☐ Full☐ One quarter to half☐ Half to full☐ Less than one quarter

7 a. Does he read English?

☐ Yes☐ No

7 b. Does he write English?

☐ Yes☐ No

7 c. Does he speak English?

☐ Yes☐ No

8 a. Does he read any other language?

☐ Yes☐ No

8 b. Does he write any other language?

☐ Yes☐ No

8 c. Does he speak any other language?

☐ Yes☐ No

9. In 1949 did he attend or participate in any native Indian ceremonies?

☐ Attended☐ Participated☐ Neither

It is apparent that this schedule was designed merely to supplement the regular population and housing schedules used in the enumeration of the general population of the United States in 1950. This Indian reservation schedule provided only the necessary identification of Indians by tribe and clan, together with information on a small number of key indicators of the degree of acculturation and assimilation attained by the tribe in question. The basic information on the socioeconomic condition and other characteristics of the Indian population was supplied by the regular schedules.

As in 1930, the 1950 Indian census was carried out by regular census enumerators. However, in those areas containing the reservations selected for special enumeration, the enumerators were selected to include a high proportion of individuals acquainted with the reservation area to which they were assigned. Many of the staff members of the Bureau of Indian Affairs once again participated in the enumeration, both in its preparatory phases and in supervising or conducting the actual fieldwork.

With respect to the fundamental problem of defining an Indian for census purposes, the following instructions, contained in the 1950 Enumerator's Reference Manual, are significant:

116. *Negroes*.—Report "Negro" (Neg) for Negroes and for persons of mixed white and Negro parentage. A person of mixed Indian and Negro blood should be returned as a Negro, unless the Indian blood very definitely predominates and he is accepted in the community as an Indian.

117. *American Indians*.—Report "American Indian" (Ind) for persons of mixed white and Indian blood if enrolled on an Indian Agency or Reservation roll; if not so enrolled, they should still be reported as Indian if the proportion of Indian blood is one-fourth or more, or if they are regarded as Indians in the community where they live In those counties where there are many

Indians living outside of reservations, special care should be taken to obtain accurate answers to item 9 [Race]. [Bureau of the Census, 1950, pp. 33-34.]

In interpreting the above instructions, it should be borne in mind that the enumerators were not instructed to ask any question on race unless they were in doubt, or were seeking to determine the race of some unrelated, absent member of a given household. Thus, persons residing outside the confines of the selected Indian reservations were ordinarily classified as Indians only if the enumerator so decided on the basis of the appearance of the individual or individuals he personally contacted, or on the basis of his personal knowledge of the local community. This procedure could be expected to yield a certain amount of misclassification in communities containing significant numbers of Mexicans and Indians, or in communities containing admixtures of Indians, Whites, and/or Negroes, or, finally, in communities containing small numbers of scattered Indian families.⁶⁴

Furthermore, it is apparent that when the enumerator did ask the race of a respondent, he would be forced to rely largely on the response given. In practice, this was especially true with respect to questions on blood quantum. Any individual who claimed to be an Indian would be likely to claim at least the minimum blood quantum of one-fourth Indian blood, in view of the legal significance of this quantum for purposes of inclusion on the rolls of many Indian tribes. It must therefore be stressed that, in practice, no objective check is provided on the judgment of the enumerator or on the assertions of the respondent.

In regard to the enumeration of Navahos, however, it should be recognized that the above limitations apply to a relatively small fraction of the total population. Even as late as 1960, the vast majority of Navahos residing in the Southwest could be readily identified as Navahos by anyone familiar with the region and its inhabitants. The relative accuracy with which Navahos could be identified in the 1950 census was further enhanced by the fact that most of the Indian agency areas in Arizona and New Mexico were among those selected for special Indian enumeration, using the Indian reservation schedule. Thus the vast majority of Indians residing in these States were identified by tribe as well as by race. As a result, there is little likelihood that significant numbers of Indians were misclassified in regard to their tribal affiliation, and the relative number of Indians whose tribal affiliation was not specified was very small.

With respect to the coverage of the enumeration in the Navajo Agency area, a number of limitations must be noted.

⁶⁴ This basic weakness is well recognized by a number of authorities on census procedures as they pertain to the collection of data on ethnic or racial composition. See, for example, Hadley, 1952 b, and Beale, 1954.

First, the period during which the decennial census occurred (mostly during the first 2 weeks in April) is unfortunate from the viewpoint of achieving maximum coverage of the population. At this time, many Navaho families and individual members of families regularly leave their relatively permanent winter residence for temporary summer encampments and/or seasonal off-reservation employment. Thus, many of the winter residences are likely to be vacant at the time of the enumerator's call. It need hardly be added that repeated "call-backs" are not likely to prove feasible when each visit may involve several hours' travel over poor roads.

Secondly, it should be noted that the tribal affiliation of the Indian population residing outside of the selected Indian agency areas was not specified in the 1950 census. As noted previously, the number of such persons was relatively small in the Southwestern States, but there remained the possibility that numbers of Navahos who were residing (permanently or temporarily) away from their agency area were identified only as Indians and not as Navahos. Although the temporary absentees would presumably have been listed with their family members within the reservation area, there is no guarantee that a considerable proportion of them were not omitted from the enumeration conducted in the agency area.

It is difficult to estimate the total number of off-reservation Navahos who were not identified as such by the 1950 census enumerators, even though they may have been classified as Indians. In this regard, however, a comparison of the total number of Indians enumerated in Arizona, New Mexico, and Utah with the number reported as residents of the specified reservations or Indian agency areas is instructive (table 25).

The total Indian population enumerated in these three States in 1950 was 112,285.⁶⁵ Of this total 64,274 or 57.2 percent were identified as Navahos, while a further 43,192 or 38.5 percent were identified with other specified Indian agency areas. This leaves a remainder of 4,819 or 4.3 percent whose tribal affiliation was not specified. It is possible to draw certain inferences regarding the probable tribal affiliation of this residual group by examining the figures given for the resident, service area, and enrolled populations shown in columns 1, 2, and 3, of table 25. The figures for the resident service area populations were obtained from unpublished tabulations of 1950 census data which were submitted to the Bureau of Indian Affairs. Those for the enrolled populations are derived from the rolls of the respective tribes as maintained in the several agencies. The resident population can be defined as that actually residing within the specified Indian reservation. The service area population comprises the resident population

⁶⁵ The published totals come to 111,888 rather than 112,285. The discrepancy is explained in table 25, footnote 3.

TABLE 25.—*Reported Indian population, by State, agency, reservation, and residence, for Arizona, New Mexico, and Utah—1950*

State, agency, reservation	Population resident on specified reservations ¹	Estimated population residing in specified service areas ²	Population enrolled on specified tribal rolls ³	Population enumerated in specified Indian agency areas ⁴
Total:				
All Indians.....	93,899	113,581	116,385	107,466
Navahos.....	54,997	62,167	69,167	64,274
All other Indians.....	38,902	51,414	47,218	43,192
Percent Navaho.....	58.6	54.7	59.4	59.8
Arizona:				
All Indians.....	55,607	68,048	-----	66,201
Navahos.....	32,838	37,861	-----	38,079
All other Indians.....	22,769	30,187	26,678	28,122
Percent Navaho.....	59.0	55.6	-----	57.5
Colorado River.....	2,170	3,586	2,640	4,030
Colorado River ⁵	1,336	1,705	1,064	(⁶)
Havasupai.....	368	368	236	(⁶)
Hualpai.....	(300)	(676)	(561)	(⁶)
Yavapai.....	115	115	44	(⁶)
All other ⁷	51	722	735	(⁶)
Fort Apache.....	3,003	3,473	3,673	3,417
Hopi.....	4,611	4,834	3,528	1,392
Navajo.....	32,838	⁸ 37,361	(⁶)	38,079
Pima ⁹	5,918	6,883	7,300	4,728
Fort McDowell ⁹	192	202	212	(⁶)
Gila River ⁹	4,423	5,250	5,546	(⁶)
Maricopa.....	141	141	139	(⁶)
Salt River.....	1,162	1,290	1,403	(⁶)
San Carlos.....	3,136	3,971	3,690	3,379
Papago.....	4,468	7,377	5,756	11,176
Gila Bend.....	(⁶)	192	94	(⁶)
Papago.....	4,035	6,688	5,166	(⁶)
San Xavier.....	433	497	496	(⁶)
Uintah and Ouray.....	63	63	91	(⁶)
Kaibab.....	63	63	91	(⁶)
New Mexico:				
All Indians.....	35,450	42,300	-----	39,458
Navahos.....	20,714	22,830	-----	24,388
All other Indians.....	14,736	19,470	18,520	15,070
Percent Navaho.....	58.4	54.0	-----	61.8
Consolidated Ute ¹⁰	18	-----	-----	(⁶)
Ute Mountain.....	15	-----	-----	(⁶)
Jicarilla.....	929	955	950	(⁶)
Mescalero.....	854	1,032	1,050	(⁶)
Navajo ⁸	20,714	22,830	(⁶)	24,388
United Pueblos ¹¹	12,935	17,483	16,520	12,424
Acoma.....	1,385	1,563	1,597	(⁶)
Alamo.....	311	380	388	(⁶)
Canoncito.....	360	414	428	(⁶)
Cochiti.....	289	421	425	(⁶)
Isleta.....	1,062	1,549	1,566	(⁶)
Jemez.....	788	958	991	(⁶)
Laguna.....	1,638	2,981	3,083	(⁶)
Nambe.....	84	160	163	(⁶)
Picuris.....	98	134	138	(⁶)
Pojoaque.....	2	26	27	(⁶)
Ramah.....	(⁶)	575	597	(⁶)
Sandia.....	153	154	158	(⁶)
San Felipe.....	721	820	830	(⁶)
San Ildefonso.....	152	187	191	(⁶)
San Juan.....	324	825	834	(⁶)
Santa Ana.....	284	302	306	(⁶)

See footnotes at end of table.

TABLE 25.—*Reported Indian population, by State, agency, reservation, and residence, for Arizona, New Mexico, and Utah—1950—Continued*

State, agency, reservation	Population resident on specified reservations ¹	Estimated population residing in specified service areas ²	Population enrolled on specified tribal rolls ³	Population enumerated in specified Indian agency areas ⁴
New Mexico—Continued				
United Pueblos ¹¹—Continued				
Santa Clara.....	501	615	609	(⁵)
Santo Domingo.....	978	1, 184	1, 232	(⁶)
Taos.....	842	972	990	(⁶)
Tesuque.....	145	171	171	(⁶)
Zia.....	254	281	287	(⁶)
Zuni.....	2, 564	2, 811	2, 922	2, 646
Utah:				
All Indians.....	2, 842	3, 233	-----	1, 807
Navahos.....	1, 445	1, 476	-----	1, 807
All other Indians.....	1, 397	1, 757	2, 020	-----
Percent Navaho.....	50. 8	45. 6	-----	100. 0
Consolidated Ute ¹⁰	135	-----	-----	(⁹)
Allen Canyon.....	135	-----	-----	(⁹)
Navajo ⁸	1, 445	1, 476	(⁶)	1, 807
Uintah and Ouray.....	(1, 262)	(1, 298)	(1, 588)	(⁹)
All other agencies and reservations ⁹	(⁸)	459	452	(⁹)

¹ The original source for these data consists of a number of special tabulations prepared by the Bureau of the Census from the returns of the 1950 census and submitted to the Bureau of Indian Affairs (Bureau of Indian Affairs, 1954 a, table 1). These figures do not include a total of 21,201 Indians who were identified only as residents of the "rest of State" in these three States. Of these, 11,293 were enumerated in Arizona, 8,050 in New Mexico, and 1,858 in Utah. The figures shown above thus pertain only to Indians whose usual residence, as recorded by the census enumerators in 1950, lies within the boundaries of the specified reservations. Figures in parentheses are estimates.

² These data were prepared by the Vital Statistics section of the Branch of Health, Bureau of Indian Affairs (now a part of the Department of Health, Education, and Welfare), on the basis of the 1950 census returns and additional information obtained from counts of persons listed on tribal rolls and other sources (Bureau of Indian Affairs, 1954 a, table 2). The figures shown comprise the enumerated resident Indian population of the specified reservations in 1950 plus two additional groups of Indians: Those who were temporarily absent from the reservation at the time of the census (migratory farm workers, railroad laborers, etc.) and those who were residing in the vicinity of the specified reservation, but outside its boundaries. In theory, the former group should have been enumerated at their usual place of residence (i.e., their reservation), but in practice, the usual residence of migratory laborers is difficult to ascertain, so they are generally counted as a part of the area where they are found at the time of the census. The resultant "service area" population is, as its name implies, a useful figure for administrative purposes, since it denotes the population of Indians who enjoy ready access to the services and facilities of their respective Indian agencies. Figures in parentheses are estimates.

³ Bureau of Indian Affairs, 1954 a, table 2. These data were prepared from counts of the population listed on the respective tribal rolls in 1950 or shortly thereafter. Since the enrolled population of the Navajo Agency was not given by State, it is impossible to derive totals by State for the enrolled population. A further difficulty arises from the fact that the total enrolled population given in table 2 is 397 less than the sum of the component enrolled populations of the several Indian agencies. The total shown here was accordingly increased by 397. Figures in parentheses are estimates.

⁴ These figures pertain to the total Indian population enumerated in the specified Indian agency areas. In general, the boundaries of an Indian agency area are approximately the same as those of the corresponding service area. The Navajo Agency area population shown for each State is not given in Bureau of the Census, 1953 a, table 16, from which these data were taken.

⁵ The figures exclude 45 Chemehuevi Indians, who were included with the "rest of State" population for Arizona.

⁶ Not separately identified in the 1950 census.

⁷ Comprising Camp Verde, Cocopah, and Fort Mohave. The population of Cocopah was not reported as a separate unit in the 1950 census. The resident population of Camp Verde and Fort Mohave totaled 51 in 1950. The service area population of 722 includes 522 Indians in the Cocopah and Camp Verde service areas as estimated in 1952. Similarly, the enrolled population of 735 includes 525 Indians in the Cocopah and Camp Verde agency rolls, as determined in 1952.

⁸ Young, 1957, p. 276.

⁹ Data are from estimates prepared in 1952.

¹⁰ Since the bulk of the Consolidated Ute Agency is located in Colorado, the service area and enrolled populations of that agency were not included in the New Mexico or Utah totals. The resident population of that agency, as shown for New Mexico and Utah, are actual residents of these States.

¹¹ The communities of Alamo (formerly Puertocito), Canoncito, and Ramah are Navaho communities whose inhabitants are presumably enrolled on the Navajo Agency rolls. Thus, they are included *only* in the resident and service area population totals for the United Pueblos Agency.

Similarly, the enumerated population total given for the United Pueblos Agency excludes the Zuni Pueblo, which was reported separately.

plus the inhabitants of a zone immediately surrounding or contiguous to the reservation. These persons, in general, are assumed to enjoy ready access to the facilities and services provided on their respective reservations. The enrolled population, finally, can be defined as the total number of persons listed on the respective agency rolls.⁶⁶ In the case of the Navajo Agency, however, it is important to note that the figure given for the enrolled population was obtained by adding an estimated 7,000 "off-reservation" Navahos to the figure given for the population of Navahos residing in the Navajo Agency service area. The resultant total of 69,167 was apparently confirmed in an examination of the Navajo Agency census office rolls in 1952. It must be stressed, however, that the 1950 figure is only an estimate which hinges largely upon the accuracy of the rough estimate given for Navahos who were presumed to be outside the Navaho service area at the time of the 1950 census.⁶⁷

In comparing the figures shown in table 25 for the State of Arizona, it should be noted that there remains no residual "rest of State" population to be accounted for in the published figures of the enumerated Indian population. Therefore, the figures must be accepted without adjustment.⁶⁸ However, a comparison of the figures given for the Hopi and Papago Agencies is instructive in regard to the possible errors in classification that occurred in the 1950 census. The enumerated population of the Hopi Agency area is far below the other totals shown for this agency. This suggests either that a considerable number of Hopis were enumerated as Navahos, or that some confusion attended the allocation of enumeration districts between the Hopi and Navajo Agencies. The figures for the Papago Agency, by contrast, suggest that a considerable number of non-Papago Indians, or possible Mexicans, were enumerated or classified as Papago in the 1950 census. The corresponding count of Pima Indians in the Pima Indian Agency area was too low, suggesting that some Pimas may have been misclassified as Papagos at this time. This was due, in part, to the poor boundary distinctions between the Pima and Papago Agency areas. Thus, although any adjustment in the figures given would be quite arbitrary, these comparisons indicate that the classification of Indians by tribe at this time was far from satisfactory.

In New Mexico, there remains an enumerated population of 2,428 Indians whose tribal affiliation was not determined. In examining

⁶⁶ It should be noted that the service area and enrolled populations were originally totaled by agency and not by State. The totals are therefore the sums of the respective agency figures.

⁶⁷ The statement of Robert W. Young (1958, p. 322), is pertinent in this regard: "The figure provided with relation to the 1950 Census [69,167] relates to the number of Navajos counted in the national census of 1950, plus an estimated additional number who were absent from the Reservation at census time Since the Reservation population is usually in flux and most Navajos go and come over the course of the year, the figure reflecting the number 'off-Reservation' is largely a guess."

⁶⁸ See table 25, footnote 3, for an explanation of this point.

the figures given for the respective agencies, the first point to note is the apparent deficiency in the enumerated population of the United Pueblos Agency. Secondly, the enumerated populations of the Ute Mountain, Jicarilla Apache, and Mescalero Apache reservations were not shown separately in the published totals. It also should be remarked that the off-reservation Navaho population in New Mexico is, for the most part, located in well-defined communities or areas, such as Alamo, Canonicito, and Ramah, so that it is unlikely that large numbers of unidentified Navahos would be found among the State's residual Indian population whose tribal affiliation was not specified.

Thus, it can be tentatively concluded that the Indian population of New Mexico whose tribal affiliations were not indicated was composed mainly of Apaches and Pueblos.

Finally, the salient feature of the figures shown for the State of Utah is the absence of separate statistics on the enumerated populations of the Ute, Uintah and Ouray, and a number of smaller Indian agencies. The figures shown for the resident and/or enrolled populations of these agencies suggest a total population of approximately 2,100. This would imply a residual "rest of State" enumerated population of about 300 Indians of unspecified tribe. Although it is possible that this residual group was Navaho, it should be noted that the enumerated Navaho population of Utah is considerably larger than either the resident or the service area population of the Utah portion of the Navajo Agency. It can therefore be tentatively concluded that this residual population is not likely to be Navaho.

The general conclusion that can be drawn is that the 4,819 Indians who were evidently enumerated outside of any of the specified Indian agency areas in New Mexico and Utah did not include a very large proportion of Navahos. Furthermore, the figures shown for the Hopi Agency suggest that any undercount of Navahos residing outside the Navajo Agency area was more than compensated for by the strong possibility of an overcount of Navahos in the Hopi Agency.

A final comment should be made in regard to the discrepancy between the Navajo Agency estimate of 69,167 enrolled Navahos and the enumerated total of 64,274. The point to note here is that nearly one-sixth of the enumerated Indian population that was classified as Navaho in the 1950 census was classified solely on the basis of its residence in enumeration districts which were considered to be primarily or exclusively Navaho. Only 54,997 Navahos were actually enumerated as residents within the boundaries of the reservation. Since the regular census schedule used outside the reservation boundaries did not include a question on tribal affiliation, a total of 9,277 Indians were enumerated on regular census schedules and classified as Navaho on the basis of their residence in enumeration districts known to be occupied by Navahos.

It is clear that such a procedure does not eliminate the possibility that scattered groups of non-Navaho Indians were classified as Navahos because they lived in predominantly Navaho-occupied enumeration districts. Conversely, of course, individual Navahos or Navaho families living in areas primarily occupied by non-Navahos would have been classified with the particular Indian agency area in which they were found.

A further indication of the uncertainty attending the enumeration of Indians located off their respective reservations can be seen in comparing the total reported Navaho service area population with the total enumerated Navaho population. The census figure is 2,107 higher than the service area total. Taken literally, this would imply that 2,107 Navahos were residing outside the Navajo Agency service area at the time of the 1950 census. This figure can be contrasted to the estimate of 7,000 such Navahos as submitted by the Navajo Agency. If the larger figure is substantially correct, the only conclusion to be drawn is that a considerable number of off-reservation Navahos were not even identified as Indians by the census enumerators.

In view of the possible overlap in the classification of off-reservation Indians in the Southwest, and the further possibility that some off-reservation Indians were not identified as Indians or were missed entirely in the enumeration, it must be concluded that the discrepancies noted above cannot be substantially reduced by utilizing the census procedures that were adopted in 1950. A more accurate classification of off-reservation Indians would require the inclusion, on all census schedules, of a question on tribal affiliation together with a systematic matching procedure to check allegations of tribal membership with existing tribal rolls. Such a program would extend far beyond the scope of current decennial census procedures.

At first glance, it would appear that some of the procedural innovations of the 1960 census would have provided a significant improvement in the coverage of the Indian population. Although it is difficult to measure the extent of any such improvement, it does appear that the use of self-enumeration schedules which permitted respondents to classify themselves as to race resulted in the proper classification of many Indians who might not have been recognized as Indians in former censuses. However, this improvement is only important in off-reservation areas where significant numbers of Indians might reside, and where they might not be recognized as Indians by the average census enumerator. The proper classification of a person as an Indian or non-Indian is seldom problematical in a reservation area.

On the other hand, the attempt to use mailed questionnaires in an area such as the Navajo Reservation is hopeless. Most Navahos do not possess mailing addresses, do not live on established mail routes,

and are unable to fill out questionnaires without considerable assistance. This situation was of course clearly recognized during the 1960 census, in which the entire enumeration was conducted without any mailed questionnaires, except for the few communities where such a procedure could be employed.

A further limitation of the 1960 census was the exclusive reliance upon standard census schedules. Since so many of the standard census questions are practically inapplicable in the context of reservation life, or require careful explanation and qualification in order to be understood by the respondent or properly interpreted by the data user, the use of a regular census schedule lends an air of unreality to much of the enumeration.⁶⁹

Finally, the failure to obtain information on the tribal affiliation of all Indians severely limits the practical value of the census data. Since the members of the different tribes are increasingly mobile, it is no longer realistic to assume that all Indians living in an area traditionally associated with a given tribe are members of that tribe. In 1960, for example, many Hopi Indians, attracted to the area by the employment opportunities afforded by the construction of a gas pipeline, the Glen Canyon Dam, and other projects, were residing in the vicinity of Tuba City, well within the boundaries of the Navajo Reservation. Since no information on their tribal affiliation could be obtained, these Hopis would necessarily have been classified as Navahos.

Even in the few areas where tribal admixtures are not important, the identification of Indian areas in terms of county boundaries in 1960 imposed a further limitation on the usefulness of the data. Since many reservations cut across county lines, and many counties contain two or more reservations, the resultant tabulations frequently combine the population characteristics of two or more heterogeneous tribal groups.

In short, the important technical advances that were made in the 1960 census procedures did not significantly improve either the quality or the usefulness of the data for such special populations as the Navaho Indians. Only the inclusion of a question on tribal affiliation would permit the preparation of separate tabulations showing the social and economic characteristics of the more important tribal groups. Furthermore, the use of a special census schedule in the major reservation areas is essential in order to provide meaningful data on social and economic characteristics, acculturation, and the like.

⁶⁹ For example, housing questions pertaining to number of rooms and plumbing facilities elicited much humor and some embarrassment; those relating to the "size of this place" and the "value of this house" created much confusion. A brief analysis of Navaho population characteristics, as derived from the results of the 1960 census, is presented in Hilary and Essene, 1963.

Since the first special enumeration of Indians in 1890, it has been the traditional practice of the Bureau of the Census to obtain information on reservation Indians by means of special schedules at 20-year intervals. It is to be hoped, therefore, that the plans for the 1970 census will provide for an entry of tribal affiliation for all Indians, wherever they are residing, and will delineate all major reservation areas as areas requiring special procedures and appropriate census schedules.

THE SOIL CONSERVATION SERVICE

For the period 1936 to 1940, a third major source of information on the population of the Navaho is to be found in the results of the Human Dependency Survey, conducted by the Human Dependency and Economic Surveys Section of the Soil Conservation Service, U.S. Department of Agriculture.⁷⁰ This survey was carried out as a part of a systematic and integrated description of the 19 land management units (or districts) comprising the Navajo and Hopi Reservation areas (Soil Conservation Service, 1938; Bureau of Indian Affairs, 1941 b). The chief purpose of the Human Dependency Survey was to obtain information on the number and distribution of the inhabitants of each land management district, together with their patterns of land use and settlement, their stock holdings, means of livelihood, and general economic condition. Demographic information was collected as an integral part of this research. These findings were correlated with estimates of the carrying capacity of each district and of its potential for further development as indicated by available soil, water, and other natural resources.⁷¹

A major procedural innovation of the Human Dependency Survey was the recognition of the "consumption group" rather than the conventional biological or nuclear family as a basic socioeconomic unit of organization among the Navaho and Hopi residents of the area. As the following definition indicates, the consumption group is, in most instances, practically identical with the biological family, but its use as

⁷⁰ Dr. John Provinse was the director of the Section of Conservation Economics in the Navaho-Hopi area during most of this period. Mr. J. Nixon Hadley, to whom I am indebted for much of the information concerning both the organization and the results of this survey, was the immediate supervisor of the staff of field enumerators.

A similar survey was undertaken among the Rio Grande Pueblo Indians, under the sponsorship of the Southwestern Regional Office of the Soil Conservation Service. On the basis of the experience gained in these two surveys, a number of similar studies were carried out on other Indian reservations. A special operating unit was established to supervise these later surveys, termed the "Committee for Technical Cooperation with the Bureau of Indian Affairs," or "T.C.B.I.A."

⁷¹ The vital importance of the information sought in this survey was plainly indicated in the detailed report by Meriam et al., 1928. The need for improved statistics on population and vital trends among the several Indian tribes is well summarized on pp. 170 ff. of Meriam's report.

a unit for recording income and other economic data permitted a more realistic appraisal of the economic characteristics of the population:⁷²

The consumption group is defined as one which constantly and habitually funds and shares all forms of income, including products of agriculture, livestock and livestock products, and goods purchased from the traders. The consumption group is in the majority of instances identical with the biological family, but it consists frequently of two or more related biological families, and occasionally of unrelated biological families or individuals.

The information that was collected in the Human Dependency Survey was recorded on a "family-economy group census card" which was designed to supply the following information for each consumption group:

1. The names of all members of the consumption group, listed in the following order: the economic head of the group, his spouse, their children, and other members of the group.
2. The relationship of each group member to the economic head of the group, together with his marital status, sex, date of birth, and age.
3. The clan affiliation of each group member, and the proportion of Indian blood if the group member was not a full-blooded Indian.
4. Occupational information including the individual's work experience and a report of his physical impairments or disabilities, if any.
5. Miscellaneous information including data on crop production, livestock holdings, and other means of livelihood, and on the location of group members if temporarily absent from the group.
6. Supplementary comments—remarks pertaining to the apparent stability of the group, its growth or decline, and any peculiarities with respect to marriage patterns or other customs.

It is evident that the information called for on the above schedule was similar to that required on the census schedules used in both the special Indian censuses of 1930 and 1950, except that special attention was devoted to the problem of matching individuals contacted on the survey with existing records. However, the conduct of the survey was far different from the procedure employed in either the 1930 or the 1950 censuses.

Budgetary limitations did not permit the hiring of a large staff of fieldworkers, so that the survey was conducted over a 2-year period, from 1936 to late in 1938. This time factor has serious implications for the reliability of the population figures obtained, since the chances of duplicate counts or other inaccuracies are greatly enhanced.

Secondly, the period during which this survey was conducted was one of great stress for the inhabitants of the Navaho-Hopi area. At

⁷² Soil Conservation Service, 1938, p. 1. The "consumption group" should not be confused with the "outfit" as recognized by a number of anthropologists who have studied the economic organization of the Navaho. Although the two groups may in some instances be identical, the typical outfit is larger in size than the consumption group, and may contain as many as 50 or 100 members. It is more nearly a "production group" than a "consumption group." Furthermore, the members of the outfit may not live in close proximity and their mutual cooperation is periodic rather than continuous. For an excellent description of the outfit and its functions, see Kluckhohn and Leighton, 1951, pp. 62 f.

this time, a number of unsolved economic problems had reached a culminating point, and widespread hostility and suspicion was directed toward any outsiders who might be identified with the officialdom in charge of the drastic remedial measures then being employed. As a result, the survey could not be carried out in a number of local areas, and the accuracy of the information obtained in other areas is open to some question. The difficulties which attended the survey are well summarized in the following passage:

An attempt was made to take a dependency schedule for each consumption group in each land management unit in order to ascertain population, individual and group ownership of livestock, land operated and income data. Because of opposition in certain local areas the survey is not actually one hundred percent complete. . . . For these [specified] areas of noncoverage population has been recorded on the basis of the best available estimates of the Human Dependency Survey field workers, land management unit supervisors, local traders, and friendly local Navahos. Other data for these areas were obtained by interpolation on the basis of the averages reported for neighboring areas where the data were obtained. [Soil Conservation Service, 1938, p. 1.]

The figures shown in table 26 give some indication of the limitations of the Human Dependency Survey as a source of information on the total population of the Navaho at this time. The statistics given for 1936 are based upon the actual results of the survey. Those for 1940 were derived from preliminary unpublished tabulations prepared by the Bureau of the Census for the Bureau of Indian Affairs from the results of the 1940 enumeration in the area. Thus, a comparison of the two sets of figures for each land management unit (or district) serves to indicate the discrepancies between these two sources of data.

Perhaps the most significant discrepancy to be noted is that between the reported total reservation population in 1936 (based on the Human Dependency Survey) and that in 1940 (based upon the 1940 census). The latter figure is 24.5 percent greater than the former. Since there is little reason to suspect a significant overcount of the Navaho population during the 1940 census, it is apparent that the totals obtained from the Human Dependency Survey are deficient.

The extent of this deficiency can be approximated with somewhat greater accuracy by means of the following calculation. The survey was carried out during a period of nearly $2\frac{1}{2}$ years, from early in 1936 to the late summer of 1938. The approximate midpoint of this interval is in April 1937. Thus the statistics collected in this survey pertain, on the average, to a date approximately 3 years prior to the date of the 1940 enumeration. If we assume an average rate of natural increase of 2 percent per year during this period, we can obtain an estimate of the April 1937 Navaho population by extrapolation from the 1940 census figure. The hypothetical estimate thus derived is 37,256,

TABLE 26.—*Reported total population by land management district—1936 and 1940*

Land management district	1936 ¹			1940 ²		
	Total population	Number of consumption groups	Average size of consumption groups	Total population	Number of consumption groups	Percent population increase 1936-40
Estimated totals: ³						
Navaho.....	35,242	5,124	6.9	48,722	7,269	(⁴)
On reservation.....	31,759	4,468	7.1	39,536	5,573	24.5
Off reservation.....	3,483	656	5.3	9,186	1,696	(⁴)
District number:						
1.....	1,254	164	7.6	1,682	221	34.1
2.....	905	115	7.9	1,193	151	31.8
3 (Total).....	1,949	260	7.5	2,657	354	36.3
(Navaho).....	⁵ 1,610	⁵ 200	⁵ 8.0	2,194	⁵ 271	⁵ 36.3
(Hopi).....	⁵ 339	⁵ 60	⁵ 5.6	463	⁵ 83	⁵ 36.6
4.....	2,422	284	8.5	2,856	336	17.9
5.....	1,212	133	9.1	1,455	160	20.0
6.....	2,779	493	5.6	(⁶)	(⁶)	(⁶)
7.....	1,856	232	8.0	2,719	340	46.5
8.....	1,666	220	7.6	1,720	226	3.2
9.....	1,830	230	8.0	2,285	286	24.9
10.....	2,731	396	6.9	2,995	434	9.7
11.....	1,463	201	7.3	1,495	205	(⁴)
12.....	3,960	650	6.1	5,534	907	39.7
13.....	950	156	6.1	1,232	202	29.7
14.....	2,473	368	6.7	3,209	479	29.8
15 (On reservation).....	459	67	6.9	625	91	(⁴)
(Off reservation).....	(⁶)	(⁶)	(⁶)	850	123	(⁶)
16.....	3,483	656	5.3	5,536	1,045	(⁶)
17.....	3,841	545	7.0	4,449	636	15.8
18.....	3,127	507	6.2	3,593	628	24.5
19 (Off reservation).....	(⁶)	(⁶)	(⁶)	2,800	528	(⁶)

¹ Soil Conservation Service, 1938, table 1.² Bureau of Indian Affairs, 1941 b, table 1.³ All estimated totals pertain to the Navaho only. The estimated number of Hopi in district No. 3, and those reported in district No. 6, were therefore excluded from these estimated totals.⁴ Percent increases were not calculated for the total Navaho, the off-reservation Navaho, or for the populations of district Nos. 11, 15, and 16, because of boundary shifts which vitiate comparability of these data. The major boundary changes were as follows: District No. 11 was about 10 percent larger in 1940 than in 1936; district No. 15 (on-reservation) was about 13 percent larger in 1940; districts No. 15 (off-reservation) and 19 were not reported in 1936; and district No. 16 was about 72 percent greater in 1940. Percent increases for the Navaho and Hopi in district No. 3 are estimates, based upon the estimated populations in these categories, as obtained through the procedure outlined in footnote 5.⁵ The 1936 population figures given for district No. 3 were distributed between Hopi and Navaho according to their proportionate distribution in the same district in 1940. The resultant figures for both population and consumption groups are therefore estimates. The number of consumption groups reported for district No. 3 in 1936 was distributed between the estimated Hopi and Navaho populations of that district on the assumption that the average size of Hopi consumption groups in district No. 3 was the same as in district No. 6, which is exclusively Hopi. The remaining consumption groups were then assumed to be Navaho.

The number of consumption groups in 1940 was calculated on the assumption that their average size was the same as in 1936, when it was originally determined from the data provided. The number of consumption groups in district No. 3 was distributed between the Hopi and the Navaho on this basis.

⁶ Data not available.

or 17 percent above the total on-reservation population reported in the Human Dependency Survey.⁷³

Comparisons between most of the figures given by land management district are unwarranted in view of the numerous changes in district boundaries that occurred during the interval between the survey and the census of 1940. Furthermore, some of the differences in the population totals of the several districts undoubtedly reflect actual changes that occurred in the interim through migration and natural increase. It should be noted, however, that the largest population increases are indicated in the land management districts located in the northern and

⁷³ This estimated deficiency is, of course, only suggestive, and is probably minimal. To the extent that the 1940 census was itself deficient in coverage, and/or the assumed rate of natural increase too high, the deficiency in the 1936 survey total would be even greater.

western parts of the reservation (map 4). This suggests that the Human Dependency Survey, like many of the earlier surveys, was inadequate in its coverage of the less populated and less accessible regions of the reservation. It must be stressed, however, that the major discrepancies between the 1936 and the 1940 figures shown in table 26 are due to the omission, in the 1936 data, of the off-reservation population in districts 15 and 19, and to the enlargement, in 1940, of the boundaries of districts 11, 15, and 16.⁷⁴

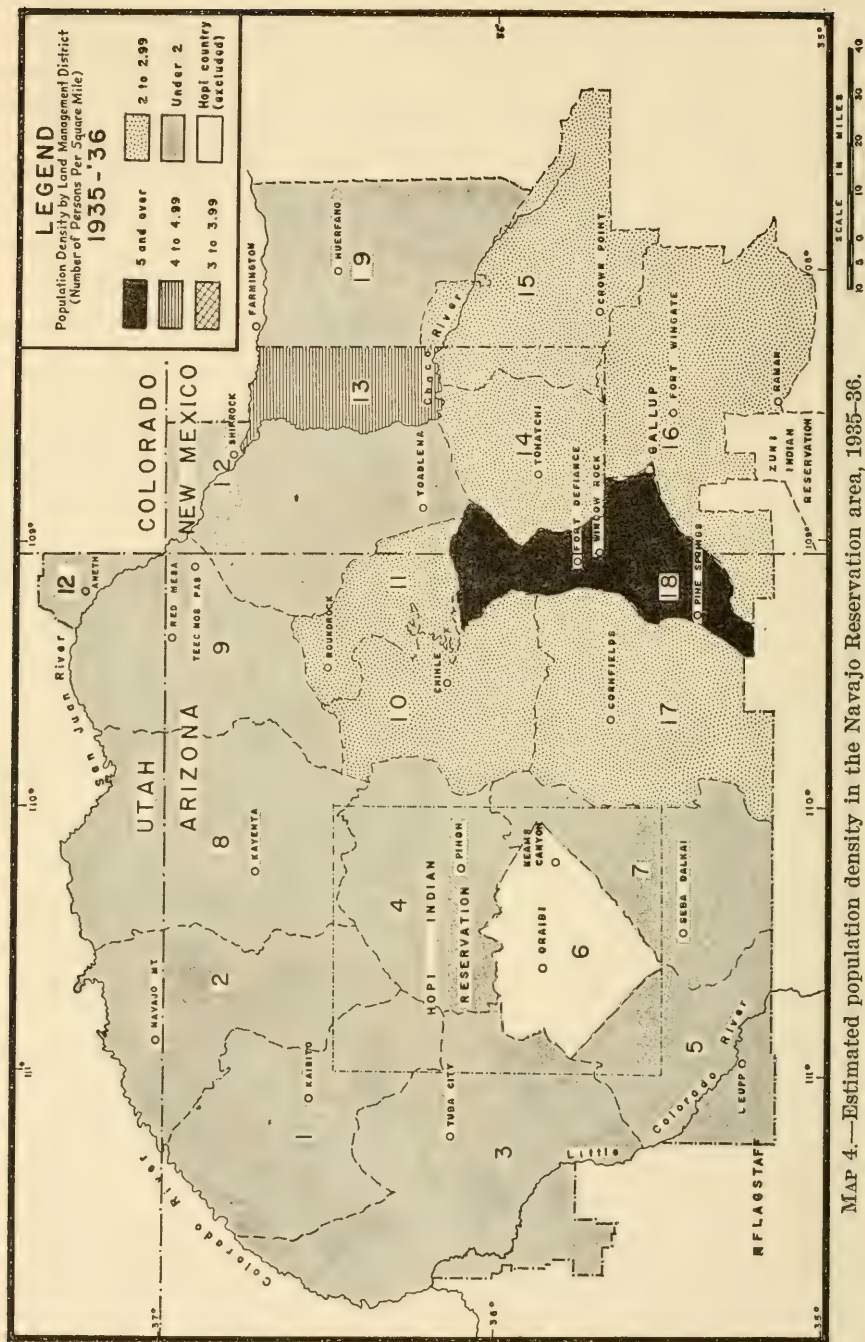
The operational reliability of the consumption group as a unit for purposes of recording socioeconomic data in large-scale censuses and surveys cannot be determined on the basis of the findings shown in table 26, because the 1940 census enumerators recorded their information in terms of conventional household and family units.⁷⁵ However, the 1936 data do suggest that the average size of the consumption group tends to equal that of the biological family among off-reservation Navahos, while it remains somewhat larger in the more isolated parts of the reservation. This suggests, in turn, that the consumption group and the biological family tend to converge toward identity among the off-reservation Navahos.⁷⁶

To conclude, the chief value of the Human Dependency Survey was its delineation of more significant geographic areas and its recognition of functional socioeconomic groupings among the inhabitants of these areas. It should be noted, further, that this survey was a pioneering effort in the execution of an integrated, cooperative research project whereby the skills of experts from a variety of fields were focused upon a common problem. Despite seeming deficiencies in the coverage of the survey, the establishment of the land management districts as units for the recording of data on the socioeconomic characteristics of the Navaho population has permitted the accumulation of valuable information on both the distribution and the socioeconomic status of this population. As an enumeration of the total population, however, this survey falls short of the basic requirements, both in regard to the completeness of coverage and in regard to the length of time required for its completion.

⁷⁴ These changes are detailed in table 26, footnote 4. The staff members of the Human Dependency Survey estimated the total Navaho population as of December 31, 1935, at over 43,000, including the residents of the extension area not included in the 1936 figures shown in table 26. This estimate is given in Soil Conservation Service, 1936, table 1.

⁷⁵ The number of consumption groups in each land management district in 1940 was estimated by dividing the 1940 population of each district by the average size of consumption groups reported for that district in 1936.

⁷⁶ The average (arithmetic mean) size of a group of 101 Navaho families studied in 1944 was 7.3 persons (Tomlinson, 1944). These families were located in land management districts 15 and 19, on the eastern fringes of the Navajo Reservation. The average size of the consumption groups in district 15 was 6.9 persons. However, the above study may have been selective of families of above-average size. At the time of the Human Dependency Survey, the average size of all Navaho families was reported to be 5.7 persons. (Kimball, MS.)



MAP 4.—Estimated population density in the Navajo Reservation area, 1935-36.

Maps 4 through 7 illustrate the changes which have occurred in the distribution of the population of the Navajo Reservation, together with the growth of this population in the period from 1935-36 to 1957. The estimated population of each land management district for the years 1935-36, 1947, and 1957, were supplied through the courtesy of J. Nixon Hadley of the Division of Indian Health, U.S. Public Health Service. A comparison of map 4 with maps 5 and 6 reveals the most significant movements of the population in this area at this time; to the southeast and to the northeast. The former movement reflects increasing participation of Navahos in off-reservation economic activities. The latter movement reflects their participation in the development of the oil resources of the Aneth region and the uranium and other mineral resources that are processed in the Shiprock region. The population increases shown in map 7 demonstrate the high growth rate that is characteristic of most of the districts on the reservation at the present time.⁷⁷

A SUMMARY OF NAVAHO POPULATION GROWTH

Despite the three centuries of Spanish hegemony in the Southwest, contacts between the Spanish and the Navaho appear to have remained extremely tenuous. In his account of the first century of Spanish colonial activity in this region, Fray Zarate-Salmeron refers to the "populous, warlike, and valiant nation of the Apaches," said to occupy the vast reaches of a mythical land, the "Gran Teguayo." His report contained no population estimates, but it did refer to a stretch of mountains to the west of Santa Fe as the "Casa fuerte o Nabajú" (Zarate-Salmeron, 1949, pp. 67-71).⁷⁸

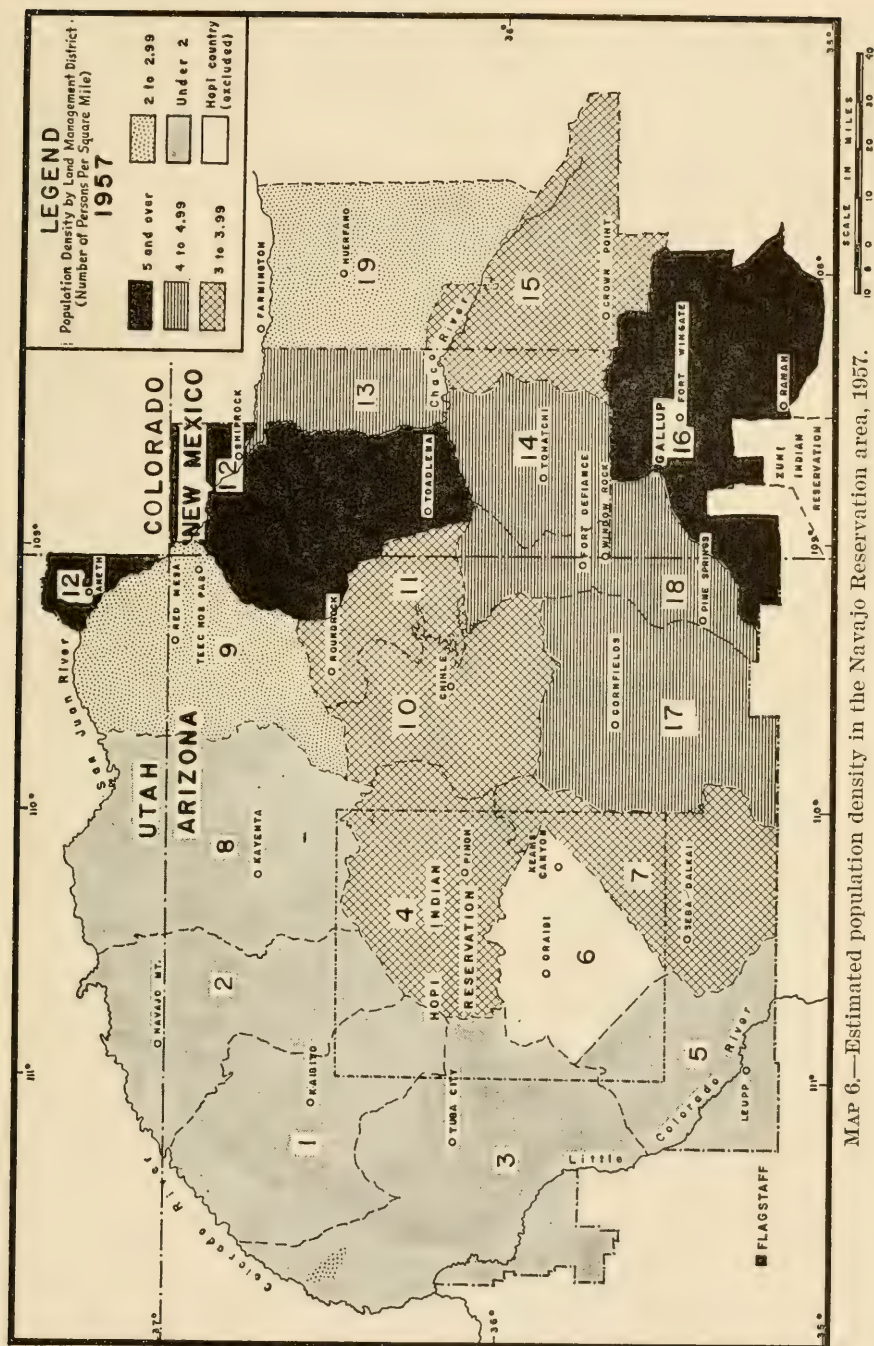
The first known explicit estimate of the Navaho population to be found by me is that of Fray Alonso de Benavides, who, with disarming simplicity, estimated their number as "over 200,000 souls." His painfully naive account of the procedure whereby he arrived at

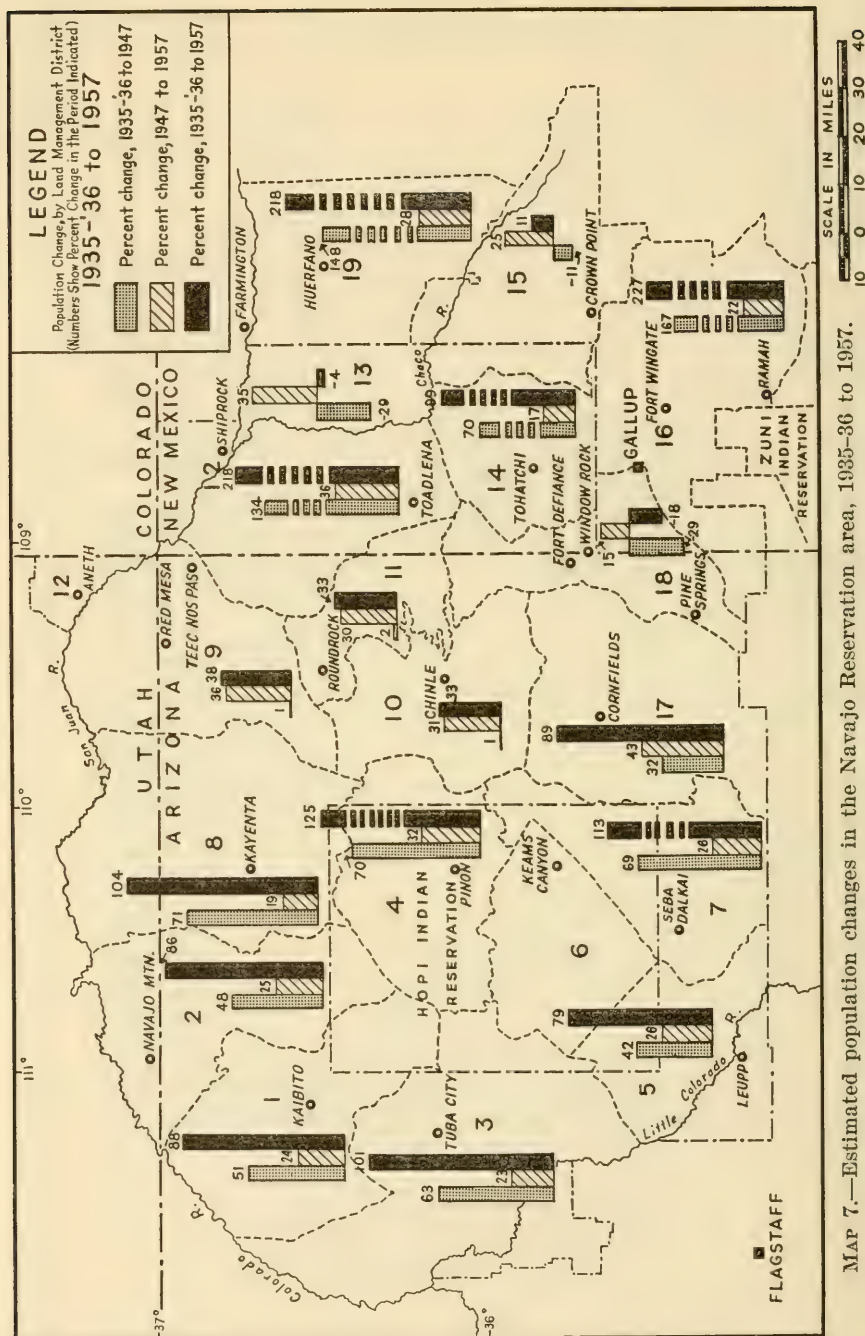
⁷⁷ It should be noted that, since 1957, the construction of the Glen Canyon Dam on the Colorado River just below the Utah boundary has attracted large numbers of Navaho and Hopi workers. This construction, together with the development of improved roads in the western part of the reservation, will undoubtedly result in the establishment of a larger population in this area.

⁷⁸ It is apparent that the range of mountains referred to here as the "Casa fuerte o Nabajú" was the southeastern tip of the San Juan Mountains, an area about 70 miles northwest of Santa Fe, N. Mex., between the Chama and Rio Grande Rivers. This same region is identified as "old Navajo country" on a map of Navaho country in 1776, based on a map of the expedition of Fathers Dominguez and Escalante in that year (Van Valkenburg and McPhee, 1938, p. 6).

It is interesting to note, albeit in a speculative vein, that the first outsider actually to come into contact with Navahos may have been an African. Fray Marcos de Niza, reporting on his discovery of Cibola (Zuni Pueblo) in 1539, mentions the fact that he ordered Stephen Dorantez, the Negro, to proceed northward from the vicinity of Zuni, where he obtained an abundance of "turquoise and hides of cattle." (See Bandelier, 1890, pp. 207 and 214.)

Sixty years later, in 1599, Don Juan de Oñate completed an extensive journey throughout the region (the province of Teguas or Teguayo), visiting the Hopi, Zuni, Taos, and other pueblos. He estimated that the entire region contained 70,000 Indians, which would not be much less than its present Indian population (Bolton, 1916, p. 216).





this figure is a dismal foreshadow of the many fanciful estimates that were to follow:

"... They [the Navaho Apaches] assembled more than 30,000 [warriors, presumably] to go to war in less than 8 days. This is a very conservative estimate, because the Sergeant Major of the Spanish soldiers told me that once when he had fought them in a war he had seen more than 200,000 as near as he could estimate (sic)." [Benavides, 1945, p. 85.]

In an earlier annotation to Benavides' report, Hodge and Lummis express doubt that the Navaho could actually have numbered as much as 4,000 at this time. Later in the 17th century, Padres Delgado and Irigoyen were reported to have "interviewed" some 4,000 Navahos, suggesting the existence of a much larger population (Benavides, 1916, pp. 44 and 59 f.). These early estimates should generally be viewed in the light of similar statements by missionaries elsewhere in the Americas. Their proselytizing zeal apparently prompted them to frequently exaggerate the number of potential converts to Christianity.

The first apparently realistic estimate of the Navaho population was reported over a century later, when, in 1776, a Spanish official returned from a visit to "all" of the Navaho hogans. His report to the governor of New Mexico stated that the Navaho consisted of some 700 families totaling about 3,500 people. At about this time, the total body of "Apaches" was estimated to number some 5,000 warriors. This latter estimate, reported at the Council of Mondova, was accompanied by the statement that the "Lipanes, Gilenos, and Nabajos [Navaho]" were among the most numerous tribes in the Apache group (Bolton, 1914, vol. 2, p. 153).⁷⁹

In his account of his exploration of the southwest region in 1805-07, Zebulon Pike (1811, p. 337) makes the following brief reference to the Navaho:

The 'Nanahaws' are situated to the Northwest of Santa Fe, and are frequently at war with the Spaniards. They are supposed to be some 2,000 warriors strong.

On the basis of this figure, Schermerhorn (1814, vol. 2, p. 29) estimated the total Navaho population at 6,500 persons.⁸⁰ From this time until the rounding up of the bulk of the tribe at Fort Sumner, the several estimates of the Navaho population serve merely to indicate the prevailing ignorance with regard to this tribe. For example, Gregg's (1855) estimate, pertaining to the decade of the 1830's, was

⁷⁹ Van Valkenburgh and McPhee, 1938, p. 5, refers to the same survey as having been conducted by Fathers Dominguez and Escalante.

⁸⁰ The assumption that the total population of an Indian tribe would number 3.5 times its warrior force is not unrealistic, but neither is it precise. Wissler (1936 c, p. 6) found; on the average, 8 to 10 persons, including 2 to 3 warriors, per tent or "lodge." This would imply a warrior population somewhere between 20 and 37 percent of the total population, or about 28 percent, on the average. Considering the probable age-sex distribution of these aboriginal populations (with a median age not much over 17 years), it seems unlikely that their warrior population could greatly have exceeded one-fourth of their total population.

10,000, while Parker (1844, p. 32) in 1838, gives an estimate of only 2,000.

After 1846, the increased number of population estimates and other reports on the Navaho reflect the growing interest of the American authorities in this area. The several population estimates of this period vary from a low of 5,000 reported in 1849 to a high of 15,000 as estimated in 1860. Most of the estimates are in the range 8,000 to 10,000 (table 27, p. 136).

The removal of the majority of the tribe to Fort Sumner in 1864 made possible the first actual enumeration of at least the captive portion of the Navaho population. One of the first of these enumerations is summarized in a letter dated August 27, 1864.⁸¹ At this time, 5,911 Navahos had already arrived at the fort, and an additional 1,309 were en route thereto, making a total population of 7,220. Periodic enumerations were made throughout the Fort Sumner period, usually in connection with the distribution of ration tickets. The results of these counts were included in the regular monthly reports submitted by General Carleton to his superiors in Washington. It is evident from these enumerations that the later arrivals at the fort were compensated by the deaths and escapes that occurred there, so that the total captive population remained between 7,000 and 8,500 in number. Thus, the enumeration of May 31, 1867, produced a total of 7,406 Navahos while the report a month later estimated the total captive population as about 7,500 at this time (Dodd, 1868, p. 203).⁸²

The decade of the 1860's was unquestionably a period of great hardship for the Navaho. In his report of the hostilities immediately preceding the surrender of the Navaho tribe, Brigadier General Carleton noted that 301 Indians had been killed. Although some of these casualties were Apaches, the loss to the Navaho was not inconsiderable. The "long walk" to Fort Sumner, a journey of some 300 miles, also took its toll; Carleton mentions the death of 197 out of a single group of about 2,600 Navahos who undertook this journey. These losses, together with the severe privations experienced during the 4 years at Fort Sumner itself, appear to have halted, at least temporarily, the increase in the Navaho population.⁸³

⁸¹ Carleton (MS.) expressed the opinion that no more than 1,000 Navahos remained at large at this time and that most of these had fled beyond the Little Colorado River to the West. Cf. Underhill, 1956, p. 119.

⁸² The Navaho population at Fort Sumner apparently reached a peak of well over 8,000 by the end of 1864, and declined somewhat thereafter. On Dec. 31, 1864, Capt. Francis McCabe of the First New Mexico Volunteer Cavalry conducted an enumeration of the Navahos at Fort Sumner, arriving at a total of 8,354. McCabe's reported age distribution suggests a peculiar deficiency of children under age 5. See Keleher, 1952, p. 502, footnote 105.

⁸³ General Carleton's order to Col. Christopher Carson regarding hostilities against the Navaho and Apache is contained in a letter from Carleton to Col. Joseph R. West, Santa Fe, dated Oct. 11, 1862 (U.S. Congress, 1867, appendix p. 99). His summary of the results of these operations is contained in General Order No. 3, dated Feb. 24, 1864 (*ibid.*, pp. 247-257).

The question of the number of Navahos who were never brought into captivity at Fort Sumner remains controversial. Two groups of Navahos must be considered in this connection: those who escaped captivity by moving into the farther reaches of the Navaho hinterland, and those who had previously been taken captive by Mexican and other settlers in the region. Chief Justice Kirby Benedict, testifying in 1866, estimated the number of the latter group as "considerably exceeding 2,000," of whom a large proportion were Navahos. The size of the former group was a matter of disagreement between General Carleton and Colonel Carson. General Carleton, who hoped to create at Fort Sumner a kind of model community for the transformation of hostile Indians into peaceful agriculturalists, arrived at the understandably optimistic conclusion that fewer than 500 Navahos escaped captivity. On the other hand, Carson, whose familiarity with Navaho country was probably unequalled, asserted that the Navaho numbered at least 12,000, implying that only about half of them had surrendered to his troops.⁸⁴

The first report on the population of the Navaho following their return to their former homeland in 1868 estimates their number at about 8,000. Included in this figure were "several hundred that were never captured and brought to Fort Sumner" (Davis, 1869). About a year later, on October 2, 1869, the first distribution of sheep and goats at Fort Defiance was made the occasion for a general enumeration. In total, 8,181 Navahos were counted as they passed through the gates of the stockade to receive their allotment of animals (Bennett, 1870).⁸⁵

From that time until the present, information on the total population of the Navahos has been provided by two major sources: the Annual Reports of the Commissioner of Indian Affairs and the decennial censuses of the Bureau of the Census. The former source contains the annual reports of the several agents assigned to the various Indian agencies. In these reports, the Indian populations in their respective jurisdictions are estimated. The latter source provided important supplementary data on Indian population when special enumerations of Indians were undertaken in 1890, 1910, and 1930. In its other decennial enumerations, the Bureau of the Census

⁸⁴ Carleton's estimate was evidently based upon his interview with Herrera, one of the Navaho chiefs at Fort Sumner. The pertinent figures are reported in a letter from Carleton to Capt. Erasmus W. Wood, dated Mar. 21, 1865 (U.S. Congress, 1867, appendix pp. 221 f.). Carson's estimate is reported in Dunn, 1958, p. 397. Mooney, 1928, p. 21, seems to have accepted Carson's estimate.

⁸⁵ The annual report of the following year (Bureau of Indian Affairs, 1871, Doc. 124) mentions some 2,000 Navahos "roaming with other tribes," in addition to those enumerated at Fort Defiance. Even allowing for some duplication, this would imply a total population of close to 10,000 Navahos at this time. Other authorities regard even this figure as too low. For example, Laura Thompson, 1951, p. 30, footnote 6, argues that the present population of the Navaho implies that there must have been about 12,000 Navahos in all in 1868.

obtains some information on the Indian population, but does not classify the respondents according to their tribal affiliation (see pp. 98-121). The annual report of 1872 (Bureau of Indian Affairs, 1872, p. 52) is of particular interest in regard to the question of the number of Navahos who managed to escape captivity at Fort Sumner. This report gives the total number of Navahos as "9,114, an increase of 880 over last year's enumeration, . . . due mainly to the return of captives by the Mexicans." As previously mentioned, this report suggests that in estimating the true Navaho population at this time, it is necessary to consider three population groups: those at Fort Sumner, those who escaped to the West, and those who were enslaved by the Mexicans and others.

In 1875, the Navaho population was reported as 11,768. In 1884, the estimate had risen to 17,200. In 1885, the estimate jumped to 21,003. The 1884 estimate implies an average annual rate of increase of 5.44 percent between 1872 and 1884, while the 1885 estimate implies a similar rate of 6.63 percent from 1872 to 1885.⁸⁶ Either of these rates is clearly implausible for any population not receiving substantial accessions of immigrants from beyond its boundaries. The question remains, however, of deciding whether the earlier estimates are too low or the later ones too high. Unfortunately, neither the census enumeration of 1890 nor the subsequent annual reports of the Navaho agents shed much light on this question. In the special enumeration of Indians at the 1890 census, a total of 17,204 Navahos was reported. However, this enumeration was generally considered to have been faulty and incomplete.⁸⁷ Meanwhile, the estimates of the Navaho agents during this period varied between 15,000 and 20,000.⁸⁸ These estimates suggest that the figure reported for 1885 was too high, but their own precision can scarcely be relied upon.

Following the 1890 census, the annual reports of the Navaho agents contain little information on population. The reports for some years merely repeat the figures given at the previous year. Thus, for example, the report of 1896 gives the Navaho population as 20,500, and the reports of 1896-98 quote the same figure. In such a case, repetition scarcely increases credibility.

The report of the second special enumeration of Indians, conducted by the Bureau of the Census in 1910, gave the total Navaho population

⁸⁶ The procedure for computing average annual rates of natural increase is described in the Appendix.

⁸⁷ Bureau of the Census, 1894, table V, pp. 82 ff. A criticism of this first Navaho enumeration is given in Hodge, 1910, p. 42.

⁸⁸ Patterson, 1886, gives the Navaho population as 17,358; Vandever, 1890, gives it as about 14,000 or 15,000; Bureau of Indian Affairs, 1895, gives it as 20,500. The official estimate for 1890 of 14,000 to 15,000 apparently explains why Washington Matthews regarded the 1890 census figures for the Navaho as too high. (See Krzywicki, 1934.) The estimates cited for this period, however, suggest that the census figure for 1890 is as good as any.

as 22,455. This enumeration was later criticized as having failed to locate many Navahos.⁸⁹ The figures given by the Bureau of Indian Affairs (Navajo Agency) for the subsequent years suggest that the 1910 census figure represented a serious underenumeration. The annual report of 1910 gives the Navaho population as 29,624. In 1911, the figure reported is 30,006, and remains close to 30,000 for several years. Thus the Bureau of the Census figure was about 32 percent lower than the Bureau of Indian Affairs figure for the Navaho population in 1910.

The reports following the census of 1910 indicated further substantial growth in the Navaho population. The only apparent decline was registered between 1918 and 1919, when a drop of 1,725 reflected the evident impact of the influenza pandemic after the First World War. By the time of the third special enumeration of Indians in 1930, the Navaho population estimates had risen to about 40,000. At this time, the report of the Bureau of the Census corresponded closely to that of the Bureau of Indian Affairs. The census reported 39,064 Navahos (Bureau of the Census, 1937, table 9) while the Bureau of Indian Affairs (1930, table 2) estimated the Navaho population at 40,858.

The outstanding feature of Navaho population since 1930 would appear to be its accelerated increase, from about 40,000 in 1930 to about 82,000 in 1957. This rise apparently results from relatively recent declines in mortality, accompanied by persistently high levels of fertility, and is therefore representative of the population increases presently occurring in several underdeveloped areas, notably Ceylon and Central America.

In table 27 are listed a number of Navaho population estimates dating from the earliest period of Spanish contact to the present time, arranged chronologically. The figures shown for 1890, 1910, 1930, 1950, and 1960, which are cited as "Bureau of the Census," are the results of the decennial census enumerations of those years.

On the basis of an examination of these population totals, the following tentative conclusions regarding the broad outlines of Navaho population growth during the past 350 years can be offered: The first two centuries of Spanish domination over the Southwest appear to have been a period of gradual but steady growth on the part of the Navaho population. This population evidently increased from less than 4,000 in A.D. 1600 to over 6,000 in A.D. 1800, as the Navaho

⁸⁹ Bureau of the Census, 1915, table 9, pp. 17 ff. One criticism of this enumeration is given in Weber, 1914, p. 3. Weber stated that "To my own personal knowledge, a large number of Navajos were not enumerated in that [the 1910] census." In the discussion of the Navaho enumeration of 1910, Dr. Dixon expressed the view that the "true" population figure for the Navaho in 1910 was "somewhere between" the Bureau figure of 22,455 and the Bureau of Indian Affairs figure of 28,000 (Bureau of the Census, 1915, p. 78). Cf. Bureau of the Census, 1937, p. 40.

underwent a gradual transformation from nomadic hunters and gatherers to the more prosperous status of herders and agriculturists. The period from 1800 to the Fort Sumner captivity was evidently a time of more rapid growth, with the Navaho increasing to perhaps 12,000 by 1860. This undoubtedly made them the most powerful Indian group in this region at this time.

TABLE 27.—*Reported totals for the Navaho population—1626–1961¹*

Date	Population	Source
1626	"Over 200,000"	Benavides, 1945, pp. 85 and 89.
1626–30	4,000 or less	Benavides, 1916, pp. 44 and 59.
1680	8,000	Mooney, 1928, pp. 21–22.
1680–90	4,000 or more	Krzywicki, 1934.
1743	2–4,000 or more	Worcester, MS., p. 18.
1776	700 families; 3,500 population.	Van Valkenburgh and McPhee, 1938, p. 5.
1805–07	2,000 warriors	Pike, 1811, 337.
	6,500	Schermerhorn, 1814, vol. 2, p. 29.
1831–38	10,000	Gregg, 1855, pp. 285–287.
1838	2,000	Parker, 1844, p. 32.
1846	1,000 families; 7,000 population.	Bent, 1848, p. 11.
	13,500	Graves, 1867, p. 135.
1849	5,000	Calhoun, 1850, p. 63.
	8–10,000	Simpson, 1852, p. 79.
	12,000	Bell, 1869, vol. 1, p. 179.
	12,000	Hale and Morice, quoted in Krzywicki, 1934.
1849–50	2–3,000 warriors; 7–10,000 population.	United States Congress, 1850, vol. 1, pp. 104–115. This estimate is also given in Bender, 1934.
	1–2,000 families; 7–14,000 population.	Kluckhohn and Spencer, 1940. (Data given not found in original source cited.)
1850–51	1,500 "lodges"; 10,000 population.	United States Congress, 1851, pp. 11–12, 16.
1854	8,000	Graves, 1855, p. 172.
1854–55	10,000	Whipple, Ewbank, and Turner, 1855–60, vol. 3, pt. 3.
1855	1,500 warriors; 7,500 population.	Bureau of Indian Affairs, 1856, p. 188.
1856	7–14,000	Robert W. Young, personal correspondence, Dec. 15, 1955. The lower figure was given by Chester Faris, a former Navaho superintendent. The higher figure is estimated on the assumption that the Navaho could muster between 2,500 and 3,000 warriors (Letherman, 1856, pp. 283–297).
1857	2–3,000 warriors; 9–12,000 population.	Collins, 1858, p. 275.
1859	12–15,000	Baker, 1860, p. 350.
1860	15,000	Domenech, 1860, vol. 2, p. 7.
1861	9,000	Bureau of Indian Affairs, 1862, p. 210 ff.
1863	15,000	Bureau of Indian Affairs, 1864, p. 509.
1864	7,220 at or en route to Fort Sumner.	Carleton, 1864.
1864–65	8,354 at Fort Sumner	Keleher, 1952, p. 502.
1865	7,151 at Fort Sumner	Delgado, 1865, p. 161.
1866	12,000	Coolidge and Coolidge, 1930, p. 26. This estimate is not supported in any of the available official reports from Fort Sumner (cf. Luomala, 1938, pp. 11–12).
	7,647	Graves, 1867, p. 135. This number was said to include 1,200 Navahos "still at large and hostile."
	7–8,500	Paquette, MS., p. 7. He estimated the total Navaho population as "not over 8,500."
1867	7,500 at Fort Sumner	Dodd, 1868, p. 203.
	10,000	Van Valkenburgh and McPhee, 1938, chart following p. 53.
	over 12,000	Luomala, 1938, pp. 11–12.
1868	8,000	Dodd, 1868, p. 162.
	9,000	Young, 1955, p. 172. He points out that this number is probably insufficient to account for those Navahos who did not go to Fort Sumner, and who failed to turn up for rations after the conclusion of the Treaty of 1868.
	12,000	Thompson, 1951, p. 30, footnote 6.
	12–13,400	Vandever, 1889. Reprinted in Lipps, 1909, pp. 128–136.
	14,000	Duncan, MS.
1869	8,181	Clinton, 1870.
	9,000	Matthews, 1893. Cf. Young, 1958, p. 319.
	9,790	Bureau of Indian Affairs, 1870, Doc. 124. This purportedly included 2,000 Navahos "roaming with other tribes."
	15,000	Browne, 1869, p. 291.
1871	8,234	Bureau of Indian Affairs, 1871, p. 608.
1872	9,114	Bureau of Indian Affairs, 1872, pp. 52 and 394.
1874	9,008 "plus"	Army, 1874, p. 307.
1875	11,768	Bureau of Indian Affairs, 1875, p. 114.

See footnote at end of table.

TABLE 27.—*Reported totals for the Navaho population—1626-1961*¹—Continued

Date	Population	Source
1877	11,868	Bureau of Indian Affairs, 1877, pp. 298-299.
	12,600	Van Valkenburgh and McPhee, 1938, pp. 53-54.
1878	11,850	Young, 1955, p. 172.
1884	17,200	Bureau of Indian Affairs, 1884, p. 294.
1885	21,003	Bureau of Indian Affairs, 1885, pp. 346-347.
1886	17,358	Patterson, 1886, p. 204. The age groupings included in this report are nonadditive or overlapping; the number of children aged between 6 and 16 is given, together with the number of females aged over 14 and the number of males aged over 18. These three groups do not equal the total given, nor is the number of children under 6 years of age included in the report.
1887	15,400	Van Valkenburgh and McPhee, 1938.
	17,838	Patterson, 1887, p. 171.
1888	18,000	Bureau of Indian Affairs, 1889, p. 506 and Young, 1955, p. 172.
1889	21,000	Vandever, 1889.
1890	14-15,000	Vandever, 1890. The discrepancy between this figure and that given by the same agent for the year previous is not explained although Vandever mentions some 900 deaths during the year due to a throat disease resembling diphtheria.
	17,204	Bureau of the Census, 1894, table v. Matthews (1893) criticized this figure as being too high, apparently accepting Vandever's estimate for this year as more accurate.
1895-98	20,500	Bureau of Indian Affairs, 1895, p. 564; 1896, p. 520; 1897, p. 482.
1898	20,500	Bureau of Indian Affairs, 1898, p. 598.
1899	20,000	Bureau of Indian Affairs, 1899, p. 562.
1900	21,826	Hrdlička, 1908, p. 6.
1902	21,837	Bureau of Indian Affairs, 1902, p. 630.
1903	23,054	Hrdlička, 1908.
1904	27,379	Do.
1905	28,544	Do.
1906	28,607	Do.
1907	23,000	Van Valkenburgh and McPhee, 1938.
1908	22,600	Young, 1955, p. 172.
1910	20,000 (approximate)	Franciscan Fathers, 1910, pp. 33-34. The figures given here for the census of 1900 actually pertain to the enumeration of 1890. See also Osterman, 1903.
	22,455	Bureau of the Census, 1915, table 9, pp. 17 ff.
1911	30,006	Bureau of Indian Affairs, 1911, pp. 55-56.
1912	30,224	Bureau of Indian Affairs, 1912, pp. 73-74.
1913	30,449	Bureau of Indian Affairs, 1913, pp. 46-47.
1914	30,625	Bureau of Indian Affairs, 1914, pp. 76-77.
1915	30,871	Bureau of Indian Affairs, 1915, pp. 66-67.
1916	31,348	Bureau of Indian Affairs, 1916, pp. 75-76.
1917	31,092	Bureau of Indian Affairs, 1917, pp. 69-70.
1918	29,959	Young, 1954, p. 104.
	31,397	Bureau of Indian Affairs, 1918, pp. 87-88.
1919	29,672	Bureau of Indian Affairs, 1919, pp. 72-73.
1920	30,473	Bureau of Indian Affairs, 1920, pp. 64-65.
1921	31,414	Bureau of Indian Affairs, 1921, pp. 41-42.
1922	31,343	Bureau of Indian Affairs, 1922, pp. 29-30.
1923	30,849	Bureau of Indian Affairs, 1923, pp. 23-24.
1924	30,839	Bureau of Indian Affairs, 1924, pp. 31-32.
1925	31,985	Bureau of Indian Affairs, 1925, pp. 22-33.
1926	33,185	Bureau of Indian Affairs, 1926, pp. 32-33.
1927	34,792	Bureau of Indian Affairs, 1927, pp. 211-212.
1928	35,212	Bureau of Indian Affairs, 1928, pp. 265 ff.
	40,000	Young, 1955, p. 172.
1930	39,064	Bureau of the Census, 1937, table 9, p. 58.
	40,858	Bureau of Indian Affairs, 1930, pp. 35-36.
1932	41,689	Bureau of Indian Affairs, 1932, pp. 32-33.
1933	42,374	Bureau of Indian Affairs, 1933, pp. 110-111.
1934	42,982	Bureau of Indian Affairs, 1934, pp. 121-122.
1934-35	43,555	Bureau of Indian Affairs, 1935, appendix, p. 157.
1935	45-46,000	Young, 1954, p. 104; 1955, p. 172.
1935-36	43,775	Bureau of Indian Affairs, 1936, appendix, pp. 207-208.
1936	32,098 on reservation; 35,581 total population.	Soll Conservation Service, 1938, table 1.
1936-37	44,304	Bureau of Indian Affairs, 1937, pp. 248 ff.
1939-40	48,796	Bureau of Indian Affairs, 1940, statistical supplement.
1940	39,536 on reservation; 48,722 total population.	Bureau of Indian Affairs, 1941 b, table 1.
1941	47,835	Public Health Service files, Window Rock, Ariz. Courtesy Dr. James E. Bondurant.
1942	48,877	Do.
	60,653	Felsman, 1951, table 4e, p. 18.
1944-45	55,458	Bureau of Indian Affairs, 1945, statistical supplement, table 1i.
1945	57,722	Young, 1954, p. 104.
	67,062	Felsman, 1951, table 4d, p. 17.

See footnote at end of table.

TABLE 27.—*Reported totals for the Navaho population—1626–1961*¹—Continued

Date	Population	Source
1946	59,522 62,591	Young, 1954, p. 104. Bureau of Indian Affairs, 1950, p. 30. Felsman (1951) is a somewhat condensed version of this paper, emphasizing data for Navahos only.
1947	61,051 63,823	Young, 1954, p. 104. Felsman, 1951, table 4 b, p. 15.
1948	63,025 65,546	Young, 1954, p. 104. Felsman, 1951, table 4a, p. 14.
1949	65,000 67,317	Young, 1954, p. 104. Estimated from the number of deaths and the death rate reported for the year 1949 in Young, 1955, p. 154.
1950	54,997 on reservation; 62,167 in service area; 69,167 total enrolled population.	Bureau of Indian Affairs, 1954 a, table 2, p. 18.
1953	64,274 73,400	Bureau of the Census, 1953 a, table 16, p. 62. Public Health Service files, Window Rock, Ariz., Courtesy Miss M. Blakeman.
	74,567 76,000	Young, 1954, p. 104. Young, 1955, p. 172.
1954	75,300 78,000	Public Health Service files, Albuquerque, N. Mex. Young, 1954, p. 104; 1955, p. 172.
1955	80,500	Young, 1955, p. 172.
1957	81,700	Public Health Service files, Albuquerque, N. Mex.
1960	60,016 on reservation	Estimated from unpublished 1960 census tabulations giving the number of non-Whites enumerated in enumeration districts falling within the Navajo Reservation boundaries. Supplied through the courtesy of Francis Felsman and Everett White, Public Health Service.
1961–62	93,377 enrolled	From an adjusted count of IBM cards on file at the Data Processing Section, Gallup Area Office, Bureau of Indian Affairs, as of Dec. 7, 1961 (Young, 1961, p. 331).

¹ Additional early estimates of the Navaho population are provided in Krzywicki, 1934, appendix II, pp. 492–493; Kluckhohn and Spencer, 1940; and Worcester, MS.

The interval from 1860 to 1870 can well be termed the Navaho “time of troubles.” They undoubtedly suffered severe losses under the constant harassment of the Americans and their older enemies. It is impossible to determine their population at this time with any precision. The records indicate that as many as 9,000 Navahos made the “long walk” to Fort Sumner in 1864 and the years following. An additional 1,000 may have been taken captive by the Mexicans, Hopis, Paiutes and others who carried on extensive raids into Navaho country in the early 1860’s. Perhaps 2,000 more Navahos managed to evade both the American Cavalry and their other enemies by moving westward beyond the Little Colorado River and into the deep canyons of the upper Colorado. Additional hundreds undoubtedly found refuge among the Pueblo and other Indian groups in the area. However, the general disorganization that accompanied this profound dislocation must have brought about both increased mortality and reduced fertility. The high frequency of abortion noted among Navaho women at Fort Sumner has already been mentioned in this connection. It seems plausible to conclude that when the Navaho resumed their life on the reservation in 1868, they did not number over 10 or 12,000.

Since that time, their rapid and sustained population increase is clearly apparent, despite the vagaries of the estimates pertaining thereto. These estimates reveal a number of sudden increases which are unexplained in the original sources, but which seem to reflect

belated efforts on the part of the officials to bring their estimates into line with their own impressions of Navaho population growth. Thus, for example, the official estimates jump from 18 to 21,000 between 1888 and 1889, and again from 23 to 27,000 between 1903 and 1904. The figure of 22,455 reported in the 1910 census was widely regarded as an undercount, but the absence of significant increases in the population estimates of the subsequent 7 years is equally questionable.

A figure of 40,000 for 1930 enjoys the support of the close agreement between the Bureau of the Census and the Bureau of Indian Affairs figures for that year. The figures given by the Bureau of Indian Affairs for the years of the Second World War revealed a further large upward adjustment, from 49,000 to about 60,000 between 1942 and 1944-46. Subsequent estimates suggest that the figures given for 1940-42 were too low. The 1957 estimate shown in table 27 was compiled by adding births and subtracting deaths reported since 1953 to the estimated Navaho population in 1953. The resultant figure is an official estimate of the total Navaho population at midyear 1957.

Assuming a population of 11,000 in 1870, the implied average annual rate of increase between 1870 and 1957 is 2.33 percent—a truly remarkable rate to have been sustained over so long a period.

The 1961-62 estimate, finally, represents an adjusted count of total Navaho population from IBM cards on which information from the original Navajo Agency rolls was transcribed. This estimate (93,377) yields practically the same average annual rate of increase since 1870—2.34 percent. Similarly, it implies an average annual increase of 2.56 percent since 1950, assuming the Navajo Agency estimate of 69,167 in 1950. It is therefore apparent that the Navaho have experienced at least three generations of very rapid population growth, and that their rate of increase has itself been rising in the recent past.

A COMPARATIVE ANALYSIS OF SELECTED DATA ON THE DEMOGRAPHIC CHARACTERISTICS OF THE NAVAHO POPULATION

The chief purpose of the following is to elucidate the apparent limitations or defects in the available data on the demographic characteristics of the Navaho population, in order to indicate corresponding defects among the major sources of this information. It is hoped that this will also shed light on the problems of data collection that are revealed by these limitations, and on the utility of alternative procedures designed to overcome these problems.

SELECTED AGE DISTRIBUTIONS

Summary characteristics of 25 Navaho age distributions, together with those of 6 additional distributions for other Indian populations, are presented in table 28.

TABLE 28.—Summary characteristics¹ of selected age distributions, total Indian and Navaho Indian populations—1860-1960

Item	Arizona County Indians, 1860 census	Ramah Navaho, 1880-98 census	Total U.S. Indians, 1900 census	Ramah Navaho, 1900-18 census	Navaho Indians, 1910 census, adjusted	Total U.S. Indians, 1910 census	Fort De- flance Agency Navaho, 1915 census	Canon- citand Puer- to Navaho, 1915-20	San Juan Agency Navaho, 1916	Ramah Navaho, 1920-48	Total U.S. Indians, 1930 census	Navaho Indians, 1930 census	Navaho Indians, 1930-38 original	En- rolled Navaho, 1939, supple- mentary	En- rolled Navaho, 1939, supple- mentary	En- rolled Navaho, 1939, supple- mentary	En- rolled Navaho, 1939, supple- mentary	En- rolled Navaho, 1939, supple- mentary	En- rolled Navaho, 1939, supple- mentary
Number:																			
Both sexes-----	4,040	2,062	232,558	4,978	22,377	204,734	11,915	1,086	680	13,972	331,948	39,026	28,492	5,248	5,528	5,528	5,528	5,528	5,528
Male-----	2,102	979	117,112	2,563	11,305	134,632	5,769	520	337	6,774	170,121	19,746	14,270	2,684	2,815	2,815	2,815	2,815	2,815
Female-----	1,938	1,083	115,446	2,415	11,072	130,082	6,146	566	343	7,198	161,827	19,280	14,222	2,564	2,713	2,713	2,713	2,713	2,713
Reported ages as a percent of total population-----	(?)	88.95	98.03	97.57	99.65	99.64	(?)	99.27	99.71	99.28	99.86	99.90	80.23	98.46	98.84	98.84	98.84	98.84	(?)
Median age:																			
Male-----	21.09	12.96	19.53	13.80	15.89	19.30	14.41	18.64	14.39	17.87	20.00	17.02	15.81	19.48	18.57	18.57	18.57	18.57	17.38
Female-----	21.81	14.01	19.86	14.23	16.48	19.13	14.86	19.26	15.28	16.23	19.14	17.13	16.33	20.04	18.82	18.82	18.82	18.82	17.03
Percent under 15 years of age, both sexes-----	39.7	53.8	40.2	53.0	47.4	40.9	50.9	41.4	50.4	45.7	40.0	45.5	47.6	38.0	41.1	41.1	41.1	41.1	44.5
Measures of accuracy: ³																			
Sex ratio score-----	22.7	15.4	2.8	6.4	6.9	2.8	8.6	29.9	76.3	9.2	3.4	4.6	6.0	11.3	10.8	10.8	10.8	10.8	(?)
Male age ratio score-----	42.5	52.1	5.7	5.8	10.9	6.9	23.6	27.0	32.2	3.8	3.5	10.2	7.4	7.7	7.3	7.3	7.3	7.3	(?)
Female age ratio score-----	36.5	30.4	7.5	8.8	9.3	6.7	25.5	21.3	67.8	4.9	5.3	12.6	6.1	7.9	8.0	8.0	8.0	8.0	(?)
Unadjusted joint score-----	147.1	128.7	21.6	33.8	40.9	22.0	74.9	138.0	328.9	36.3	19.0	36.6	31.5	49.5	47.7	47.7	47.7	47.7	---
Adjusted joint score-----			14.5		17.5	15.1	42.9			6.7	12.9	18.8	25.1						(?)

Item	Reser- vation Navaho, 1950 census	Total U.S. Indians, 1950 census	Navajo Agency area Arizona and Utah, 1950 census	Navajo Agency area New Mexico, 1950 census	Navaho Defiance sub- agency Navaho, 1956-57	Esti- mated Navaho popu- lation, 1957	Enrolled Navaho total, 1957	Enrolled Navaho Arizona and Utah, 1957	Enrolled Navaho New Mexico, 1957	Total U.S. Indians, 1960 census	Navaho area, total Indians, 1960 census	Navaho area Arizona and Utah, 1960 census	Navaho area New Mexico, 1960 census	Navaho Reser- vation Indians, 1960 census
Number:	54,113	342,226	64,274	39,886	2,283	81,700	7,720	4,147	3,573	546,228	91,861	56,410	35,451	60,016
Both sexes-----														
Male-----	26,981	178,172	32,444	20,117	1,129	40,638	3,869	2,077	1,792	273,526	45,236	27,887	17,349	29,563
Female-----	27,132	164,054	31,830	19,769	1,154	41,062	3,851	2,070	1,781	272,702	46,625	28,523	18,102	30,453
Reported ages as a percent of total population--														
Median age:	99.52	(²)	(²)	(²)	95.68	(²)	99.18	99.33	98.00	(²)	(²)	(²)	(²)	(²)
Male age:	16.12	20.05	16.62	16.42	15.77	16.46	26.02	25.97	26.07	19.1	15.4	15.2	15.6	15.5
Female age:	16.70	19.19	16.76	16.58	14.86	17.06	25.75	25.37	26.12	19.4	15.7	15.9	15.3	15.6
Percent under 15 years of age,														
both sexes-----	46.8	40.9	46.3	46.8	49.2	46.2	29.4	30.1	28.5	42.2	48.9	48.9	49.0	48.9
Measures of accuracy: ³														
Sex ratio score-----	7.0	7.7	10.3	10.4	21.0	7.4	9.7	15.2	12.5	3.4	10.7	18.0	9.0	6.0
Male age ratio														
score-----	7.0	9.3	6.8	7.8	12.8	8.4	9.6	13.2	8.1	14.4	10.8	8.8	17.9	8.1
Female age ratio														
score-----	7.7	5.4	6.5	6.0	11.2	8.4	8.7	11.2	7.7	16.2	16.7	19.2	14.9	11.3
Unadjusted joint														
score-----	35.7	37.8	44.2	45.0	87.0	39.0	47.4	70.0	53.3	40.8	59.6	82.0	59.8	37.4
Adjusted joint														
score-----	20.6	31.8	30.4	27.5	25.4	26.8	-----	-----	-----	36.1	48.0	67.3	41.2	23.1

¹ The age distributions from which these summary characteristics have been derived are shown in table 31, p. 136. The source of each distribution is indicated in the footnotes to that table. Data obtained from census reports are so identified. The adjusted age distribution for the Navaho population as reported in the 1940 census was estimated by me on the basis of the reported quinquennial age groups for Navaho literates and the estimated proportions of such literates in each age group. The procedure is explained more fully in the Appendix. The chief statistician for the Navaho Agency, on the basis of unpublished tabulations of Navaho age distributions reported in the 1940 census.

² The number of persons of unknown age was not reported for these populations. In the case of the published age distributions in the 1950 and 1960 censuses, persons of

unknown age, if any, were distributed among those of known age prior to publication; their number is not reported for these particular populations.

³ The procedure for computing these measures is explained in the Appendix (see also United Nations, 1952, pp. 58-79). The reader should note that the scores that are shown in the above table for populations below 5,000 are not meaningful indicators of the reliability of the underlying age reporting, because of the chance variation that is associated with such small frequencies. These scores are nevertheless given, because they indicate the extent to which the basic age distributions depart, from smoothness, whether by chance or by virtue of actual peculiarities in the population in question. Similarly, the adjusted joint score is not given for populations under 10,000, because this adjustment produces unrealistic scores in such cases. See the Appendix for a fuller explanation of these limitations.

⁴ These measures are inappropriate for smoothed data.

The first of these characteristics to note is the median age, which was calculated for each of the 31 distributions, by sex. Comparing the male medians with the female medians for each of the Navaho age distributions, we find that, in general, the female medians are slightly higher than the corresponding male medians. The same feature can be noted in the medians derived from each of the 10 model age distributions given in table 36 (p. 178). One might conclude that there is no apparent sex bias in the reporting of the Navaho population (or in its enumeration). Slightly higher female medians can be viewed as a reflection of slightly higher female life expectancy, which is a common characteristic of the populations whose mortality experience is typified in the model life tables used to develop the 10 model age distributions.

Significant underenumeration of adult Navaho males would, however, produce the same effect. Actually, only 1 of the 25 Navaho age distributions, that of the Ramah community, 1880 to 1898, produces a median age for males which is more than 1 year below the corresponding female median. It should be noted that the same population, from 1920 to 1948, displays a reversal of this relationship, with a male median that is over 1 year above the corresponding female median. Definitive conclusions are unwarranted by these findings. The variation observed in the Ramah population may well reflect actual changes in the sex-age composition of this small community; in any case, it can be attributed also to the wide range of probable error associated with small frequencies.⁹⁰

For the period prior to 1920, we have six sets of Navaho median ages. The first two of these (1880-98; 1900-1918) pertain to the Ramah community. Both of these sets of medians are lower than any of the others given in table 28. It is possible to dismiss these low values as a function of the chance variation associated with the very small frequencies in this population. Such an interpretation is not refuted by the observations which follow, but these observations do lend a certain credibility to the Ramah statistics.

The first observation to be noted pertains to the extremely careful procedures whereby the Ramah age data were obtained. The anthropological researchers who collected these data were attempting to reconstruct the Ramah population, family by family, back to its origin around 1870. In this reconstruction, detailed genealogical records were prepared of every family in the Ramah community, including carefully authenticated and verified information on the dates of birth and death of each of its members. The basic data that

⁹⁰ As is explained in table 31, footnote 3, p. 166, the age distributions of the Ramah Navaho are synthetic figures obtained by summing the age-specific frequencies reported annually during the period specified. Since each of these totals represents the sum of 16 annual figures, the average size of the actual Ramah population during any of the specified periods would approximate one-sixteenth of the values shown in tables 28 and 31.

were supplied to me by these researchers consisted of single-year age distributions, by sex, for each year from 1880 to 1948. These data were collected by means of lengthy and repeated interviews conducted, usually in the Navaho language, with a number of Ramah Navaho respondents, in an atmosphere conducive to the highest degree of mutual confidence and cooperation. Although it must be recognized that, even under these ideal circumstances, some individuals were probably "forgotten" by these respondents, it is highly unlikely that the number of such omissions would suffice to seriously bias the resultant distributions.⁹¹

Secondly, the median ages for the Ramah community prior to 1920 are not much lower than those observed in other newly established communities. Such communities typically contain a relatively high proportion of young children and young adults. Under these circumstances, median ages below 16 are not surprising. These data do suggest, however, that the demographic characteristics of the Ramah community, for all their accuracy, cannot be assumed to be representative of the Navaho population as a whole.

Three of the remaining four sets of Navaho median ages obtained from data prior to 1920 are also extremely low, ranging from 14.39 to 16.48 years. The fourth set, for the Canoncito and Puertocito bands, averages approximately 19 years (for both sexes combined). Here, as with the Ramah, the small size of the population reduces the significance of the medians obtained. It is noteworthy, however, that the three sets of low medians pertain to the 1910 census of the Navaho population and to two agency estimates; the Fort Defiance Agency in 1915 and the San Juan Agency in 1916. All three of these populations are more likely to have been underenumerated (or underestimated) than the much smaller and relatively well defined Puertocito and Canoncito bands.⁹²

The remaining 19 sets of median ages derived from Navaho age distributions can best be interpreted by giving first consideration to the extreme values observed. The lowest medians in this group are found among the Navaho population in 1936-38, the Fort Defiance subagency population in 1956-57, and among the Indians in the Navaho area as enumerated in 1960. In the former two instances, available information regarding the procedures of data collection that

⁹¹ The most likely omissions would be children who died shortly after birth. However, the infant-child ratios for these Ramah populations, as shown in table 32, do not suggest that such omissions were significant in number. More generally, it can be argued that with any genealogical record, the probability of recall of ancestors is a function of the number of their descendants. In the case of the Ramah community, however, it should be noted that the community was founded within the living memory of its oldest inhabitants, so that these differential probabilities would scarcely have an important influence upon the recollections of its present inhabitants.

⁹² The total of 680 given in table 31, p. 158, for the San Juan Agency in 1916 represents a sample of approximately 10 percent selected by me from the original rolls for that agency. The actual population total for that agency would therefore be close to 6,800.

were employed suggests that the age distributions from which these low medians were calculated are seriously biased. In the case of the 1960 census, we can only surmise that an increased proportion of the adult population was no longer residing in the area.

The 1936-38 data were collected by fieldworkers in connection with the Human Dependency Survey, conducted by the Soil Conservation Service. These fieldworkers received stringent instructions in regard to the recording of age data for the Navaho. The common estimation procedures whereby the enumerator "assists" the respondent in providing a plausible age were reduced to a minimum, with the result that the ages of only about 80 percent of the population covered in the survey were reported.⁹³ It is plausible to infer that persons of unknown age would be somewhat older, on the average, than those of known age, so that the medians derived from the population of known age would have a downward bias.

A somewhat different bias, but in the same direction, is apparent in the data obtained from the population of the Fort Defiance subagency in 1956-57. These data were collected in connection with the first of a series of school censuses carried out in every subagency of the Navajo Reservation. As their designation implies, these censuses were designed to obtain a complete register of children of school age or nearing school age. It is plausible to conclude that in focusing upon the school-age population, these researchers (most of them teachers and other school personnel) would be more likely to overlook older persons, especially if these persons were living alone or without school-age children.

The highest medians obtained from this group of Navaho age distributions are those calculated from sample data obtained by me from the census office rolls at Window Rock, Ariz., in 1957. These medians, averaging close to 26 years, are clearly out of line with all of the other medians calculated for the Navaho, none of which is over 20 years. These high medians for the enrolled population in 1957 are a striking indication of the extent to which vital events occurring among the Navaho in the period from 1939 to 1957 were either not recorded on the roll, or were greatly delayed in the recording.⁹⁴

If we assume that the actual enrolled population in 1957 was approximately 10 times as large as the sample figure given in table 28, the total enrolled population would number about 77,000 at this time. An estimate of the U.S. Public Health Service for July 1, 1957, places

⁹³ In table 28, the number of persons of known age, expressed as a percentage of the total population, is in the upper 90's for all of the age distributions shown, except that of the Human Dependency Survey, which was only 80 percent. This lower figure is more in line with what would be expected in view of the relatively high proportion of illiterates among the Navaho.

⁹⁴ The population figures shown in tables 28 and 31 for the enrolled populations in 1939 and 1957 are from a sample of approximately 10 percent selected by me from the census office rolls at Window Rock, Ariz., during the summer of 1957. The sample selection procedure is described in the Appendix.

the total population of the Navaho at 81,700. Taking this estimate at its face value, we can tentatively conclude that about 6 percent of the Navaho population was not enrolled in 1957. The child-woman ratios for the enrolled population in 1957 (table 32) suggest that this deficiency is concentrated in the population under 5 years of age. Such a conclusion is also supported, of course, by the high median ages obtained. However, in order to bring these child-woman ratios into line with the corresponding ratios obtained from other Navaho age distributions of this period, it would be necessary to triple the number of children under 5 that appear on the roll. Such an adjustment would add about 10,000 persons to the enrolled population, giving a total of about 87,000. These very crude calculations suggest that the defects on this roll are not limited to a serious underregistration of preschool children. Although such underregistration could easily account for the high median ages obtained, the excessive population which would result from this adjustment suggests that the underregistration of deaths among adult Navahos must also be serious.

The remaining Navaho age medians possess the relative merit of being mutually consistent. As noted previously, the number of persons of unknown age is too small to affect the medians significantly, even if all such persons are of advanced age. The relatively high medians obtained from the population enrolled as of 1939 reflect the apparent omission of a relatively high proportion of children. This is borne out by the child-woman ratio for the 1939 enrolled population, as shown in table 32 (p. 168). When the ages (as of 1939) of persons enrolled after 1939 are included, the resultant median ages decline by about 1 year, on the average. The impact of these delayed enrollments is seen more clearly in comparing the child-woman ratio in table 32 for the original enrolled population. This ratio rises from 456 to 601, indicating that nearly one-third of the children under 5 in 1939 were not registered on the roll at that time. The latter ratio, it should be noted, still falls considerably below the corresponding ratios observed among the majority of the more recent Navaho age distributions.

Furthermore, it should be observed that the medians obtained from the supplementary enrolled population in 1939 are higher than those obtained from most of the remaining Navaho age distributions. Persistent underregistration of persons who were very young in 1939, combined with underregistration of deaths occurring among older persons already on the roll, undoubtedly account for this upward bias in the median ages.⁹⁵ Table 28 also shows the percentage of the total popu-

⁹⁵ The median age, like other measures of central tendency, is hardly useful as an indicator of discrepancies occurring toward either end of an age distribution. Comparison of the median ages from the original 1939 roll with those of the supplementary 1939 roll furnishes a case in point. Of the 280 persons added to my sample of the original roll in obtaining the supplementary roll for that year, 194, or about two-thirds were under 5 years of age. Nevertheless, the resultant medians were reduced by only about 1 year.

lation that is under 15 years of age (for both sexes combined). This convenient measure is a useful indicator of the general level both of the fertility and the mortality of a population. A percentage of 40 or above may be said to typify the age distribution of a population experiencing high fertility. Like the median age, this measure is naturally insensitive to minor differences in the age composition of a population. Hence the wide fluctuations that are evident in the percentage under 15 as shown for the 25 Navaho age distributions in table 28 are a further indication of the serious biases which exist among them.

Setting aside the extreme values for this percentage among the Navaho age distributions, we find that they tend to vary between 44 and 49. This central range of values would, of course, imply a median age in the neighborhood of 16 or 17 years, which is in fact observed among the same distributions.

The remaining summary characteristics of the 31 distributions presented are shown in table 28 under the heading "measures of accuracy." These measures were developed by staff members of the Population Division, United Nations, in order to facilitate comparisons among different age distributions in terms of the internal inconsistencies of each (United Nations, 1952). These measures provide a numerical score which expresses the degree to which the given age distribution departs from a smooth progression of values with respect to the characteristics measured. The "joint score" is simply a weighted sum of the separate scores, giving a weight of three to the sex ratio score and a weight of one to each of the age ratio scores. The joint score thus provides a single summary measure which describes the "goodness of fit" of the component parts of a given age distribution.

In order to improve the comparability of the summary measure, taking into account the greater chance variation in age-specific values that is associated with populations of smaller size, a further modification was introduced. This modification has the effect of reducing the joint score by an amount which is inversely proportional to the size of the population. The resultant score, which is also shown in table 28, is termed the "adjusted joint score."⁹⁶ The approximate magnitudes of scores that can be associated with data of different quality are as follows: Sex ratio scores below 2 and age ratio scores below 3 (implying joint scores below 12) reflect data of excellent quality, provided the age distribution of the actual population is not marked by unusual abnormalities. Data of fair to good quality would be indicated by sex ratio scores of 2 to 4 and age ratio scores of 3 to 6 (implying joint

⁹⁶ The value of the adjustment, which is subtracted from the joint score to obtain the adjusted joint score, is given by the formula:

$$\frac{3500}{\sqrt{P}} \text{ where } P \text{ is the size of the total population.}$$

scores below 24). Data of poorer quality, finally, would be indicated by scores above 4, 6, and 24, respectively. In general, the higher the scores, the poorer the data.⁹⁷

In order to properly interpret the scores shown in table 28, two important qualifications must be borne in mind. First, the adjustment that is prescribed as an allowance for small populations may tend to obscure real differences in the quality of data between populations that differ markedly in size. As the authors of this joint score measure indicate, its application to populations under about 10,000 is practically meaningless. Similarly, the separate age and sex ratio scores are of questionable validity with populations below 5,000.

Secondly, it is essential to recognize that a high score is subject to two possible interpretations: either the basic data are inaccurate, or the actual age distribution of the population in question is marked by sufficient irregularities (such as might be produced by the impact of war or migration, for example) to produce high scores despite highly accurate data.

In view of these limitations, these scores must be regarded only as approximate indicators of the relative accuracy of age distributions obtained from populations that are roughly comparable in their general characteristics. Where the populations in question differ markedly either in size or in other characteristics, comparisons between these scores must be regarded with extreme caution.

The scores obtained from the 25 Navaho age distributions permit of few generalizations, beyond the fact that the basic data, on the whole, can be ranked as "poor" to "fair" in quality. The Navaho sex ratio scores are particularly high as compared to those obtained from the age distributions for the total United States Indian populations. The Navaho age ratio scores are also generally higher than those of the total U.S. Indian populations (table 31).⁹⁸

⁹⁷ The cutting points set forth above to distinguish "excellent," "good," "fair," and "poor," data are essentially arbitrary. They are in general agreement, however, with the judgments expressed by the authors of this measure regarding the examples they cite (United Nations, 1952, pp. 70-71).

⁹⁸ The peculiarities of the age-sex distributions obtained for American Indians from the returns of the censuses of 1950 and 1960 merit further comment. In 1950 the distribution displayed a marked excess of males 10 years and over, especially 10 to 14 years. Calvin Beale, who has had considerable experience in analyzing these data, suggested the possibility of processing error in this regard. This notion was confirmed by means of an ingenious investigation carried out by Ansley J. Coale and Frederick F. Stephan (1962). Their chief finding was that in processing the 1950 census returns, the IBM card punchers may occasionally have punched data one column to the right of the proper position. Although most such errors would normally have been detected routinely, it was suggested that enough such errors went undetected to produce a large excess of male Indians in the 14 to 24 year group.

The 1960 census returns, however, have produced a far more glaring discrepancy—a very large excess of Indians of both sexes in the age group 55 to 59 years. A limited check of the data processing instructions and related computer programs has not uncovered evidence of processing error in this instance. It is possible that large numbers of older Indians might have been uncovered in off-reservation areas for the first time in 1960, by virtue of the self-enumeration procedure. But this would not explain the occurrence of the

Footnote continued on following page.

Comparing the scores obtained from the enrolled Navaho populations with those obtained in the decennial censuses, we find that the latter appear to produce somewhat better age data. It must be recalled, however, that these differences may be fortuitous in view of the smaller frequencies obtained from the former source.

The lowest and highest scores obtained among the Navaho age distributions are sufficiently variant to merit special consideration. The lowest scores, obtained from the Ramah data for the period 1920 to 1948, are not surprising in view of the exceptional care with which the ages of the numbers of this population were obtained and verified. These procedures would tend to minimize distortions due to "age heaping," "digit preference" or other manifestations of inaccurate procedures in recording age data. Furthermore, the Ramah population itself appears to have been sufficiently free of important migratory influences or other disturbances to maintain a relatively smooth age distribution in this period.⁹⁹

In contrast, the highest scores are found for the Fort Defiance Agency population in 1915, and for the Indian populations enumerated in 1960 in the six counties of Arizona, Utah, and New Mexico which include the Navajo Reservation. The former cases appear to reflect the crude procedures whereby ages were recorded (or assigned) by the responsible officials. In the case of the 1960 census returns, the large excess of persons reported in the age group 55 to 59 yields a considerable increase in the resultant scores.

In regard to the relative merits of the age data provided by the Bureau of Indian Affairs as against those of the Bureau of the Census, tentative conclusions can be offered.

In the first place, neither source appears to provide data on the Navaho population that are better than "fair" in quality. This conclusion, of course, rests on the assumption that the actual age distribution of both the enrolled and the enumerated Navaho populations, like those of the total U.S. Indian populations, are not marked by major irregularities at any point. This assumption is supported by our general knowledge that none of these populations has experienced severe depletion because of wars or epidemics during the past two

same excess among Indians residing on reservations. It is also conceivable that large numbers of older Indians reported their age as "about 60," or were recorded as about 60 by the enumerators. If, in such cases, the enumerator filled the circles on the census schedule for the 1900 decade and for year 0, the computer would have allocated the quarter of birth to such persons at random, with the result that three-fourths of these persons would have been tabulated as 59 years old, and one-fourth as 60. However, such a procedure could not possibly account for such a large excess of persons in the 55 to 59 group without producing a smaller but perceptible excess in the 60 to 64 group as well. The puzzle remains unsolved as of this writing.

⁹⁹ The smoothness of the Ramah age distribution is apparently enhanced by the fact that each age-specific total is the sum of the figures reported annually for a 16-year period. These synthetic totals would thus minimize the effect of year-to-year fluctuations in the numbers given. The relatively high sex ratio score obtained from this population, on the other hand, may reflect actual peculiarities in the sex ratios of this small population.

generations, with the possible exception of the influenza pandemic of 1918-19. Furthermore, it should be noted that the Navaho population totals obtained from both sources represent *de jure* rather than *de facto* populations, so that the impact of selective off-reservation migration should, in theory, be minimal.

It also can be concluded that significant improvements in the age data that are obtained from the Navaho or other similar population cannot be realized by either the registration procedures conventionally employed in maintaining tribal rolls, or by large-scale surveys, such as occur during the decennial censuses. Although intensive "depth interview" techniques, such as were employed with the Ramah population, evidently produce improved age data by virtue of exhaustive cross-checking and verification, such techniques are obviously impracticable in large-scale field surveys. The substantial cost of employing such procedures on a large scale would be prohibitive.¹

DATA ON FERTILITY AND MORTALITY

Little is known of either the fertility or the mortality of the Navaho Indians, at least until the relatively recent past. The lack of precise knowledge is only partly attributable to the inadequate registration of births and deaths, as reflected in the statistics presented in table 29. This lack is also attributable to the profound fear traditionally elicited among Navahos by the presence of a dead body. This fear, grounded in religious beliefs, is manifested in an extreme reluctance to handle the dead, or remain in their presence, or even to discuss the occurrence of death.² As for births, the chief obstacle to their registration has been, until relatively recent times, the lack of hospital facilities and the reluctance of many Navahos to utilize the facilities that were available.

Despite the absence of adequate vital statistics, however, it is possible to infer something of the broad outlines of Navaho vital rates on the basis of the evident growth in their numbers and their persistently high fertility. In general, Navaho death rates appear to have remained well below their birth rates since their return to their former homelands in 1869. There is little evidence among the Navaho of

¹ In observing the enumeration of Navahos during the 1960 census, I noted that the "simplest" questions, such as a request for information on the ages of the members of a household, frequently elicited a very lengthy debate, accompanied by considerable puzzlement, disagreement, and of course, hilarity. Under these circumstances, enumerators were likely to record the best approximation they could arrive at without attempting to verify their information.

² The implications of this traditional attitude toward death for the maintenance of accurate mortality statistics should not be overlooked. William Adams, who lived in the Shonto community for a number of years and made careful observations of Navaho life and customs, observes (1963, p. 90) that "No medical examinations have ever been held or death certificates issued for Shonto's dead." The situation would not likely be much different in a number of other communities that were, until the late 1950's, equally isolated. The avoidance taboos associated with death among the Navaho are discussed briefly in Kluckhohn and Leighton, 1951, ch. 5.

the extreme variations in mortality which were characteristic of most North American Indian tribes during the period of initial contact with European settlers (Wissler, 1936 a, 1936 b; Aberle et al., 1940; Clements, 1931; Krogman, 1935).

In his study of early Navaho history, Worcester (MS.) mentions four factors which are associated with the relative stability of Navaho death rates throughout this period. First, their food supplies were sufficiently stable to permit survival, albeit with much periodic hardship. Secondly, the early cessation of hostilities against the Americans and the effective prohibition of predatory activities both by and against Navahos after 1864 combined to eliminate the heavy male mortality which commonly occurred among Plains Indian tribes. Thirdly, the geographic dispersion of the Navaho effectively insulated them from the worst effects of epidemics which decimated the populations of many densely settled Indian villages and communities. Finally, the profound isolation of most Navahos from outside contacts permitted them to maintain a relatively stable social existence from the time of their return to their homelands in 1869 well into the 20th century.

The numbers of births and deaths that were reported as occurring among the population of the Navaho during selected years from 1884, when the first such report was made, to 1957, are shown in table 29. The 1884 report includes the earliest estimate of the Navaho fertility and mortality I found, except for scattered references regarding the mortality of the Navaho during the Fort Sumner period. As is noted in the footnotes to table 29, the data shown for the years from 1912 through 1928 were selected in order to illustrate the nature of the vital statistics that are available for this period. The reader should note, further, that Navaho vital statistics during this period are frequently combined with those of the Hopi or the small number of Paiutes residing under the jurisdiction of the Western Navajo Agency at this time.

Even a cursory examination of the crude rates of birth, death, and natural increase that are derived from these data suffices to indicate their extreme unreliability. The crude birth rates vary from lows of under 10 per 1,000 to highs of 120 per 1,000. The crude death rates display similar variation, from lows around 7 per 1,000 to highs of 120 and 178 per 1,000. Although death rates might be expected to vary more sharply than birth rates, due to the impact of sporadic epidemics, there is no historical evidence to support these amazing variations in mortality (except for the general rise in mortality that accompanied the influenza pandemic of 1918-19). The crude rates of natural increase that are derived from these data display similar implausible variation, from a net decrease of 12 percent per year to a net increase of 4.3 percent per year. It should be noted in this regard that where

TABLE 29.—*Reported Indian population, births, and deaths, by tribe, and derived crude rates of fertility, mortality, and natural increase, for selected years—1884–1957*¹

Year	Total population ²	Number of reported births	Number of reported deaths	Crude birth rate ³	Crude death rate ³	Crude rate of natural increase (percent) ³
1884 ⁴	17,200	600	400	34.9	23.3	1.16
1887 ⁵	17,838	480	138	26.9	7.7	1.92
1889 ⁶	18,000	1,400	700	77.8	38.9	3.89
1890 ⁷	17,204	410	900	23.8	52.3	-2.85
1912 ⁸	4,068	252	307	61.9	75.5	-1.36
	10,000	1,200	1,200	120.0	120.0	0
	6,535	205	178	31.4	27.2	.41
1916 ⁹	1,761	98	37	55.6	21.0	3.46
	4,203	86	56	20.5	13.3	.72
	11,915	370	190	31.0	16.0	1.50
	6,550	100	85	15.2	13.0	.22
1920 ¹⁰	1,289	55	28	42.7	21.7	2.10
	4,227	103	42	24.4	9.9	1.45
	11,280	484	300	42.9	26.6	1.63
	6,300	90	150	14.3	23.8	-.95
	2,700	152	480	56.3	177.8	-12.15
	7,000	800	500	114.3	71.4	4.29
1928 ¹¹	1,651	8	24	4.8	14.5	-.97
	5,224	91	112	17.4	21.4	-.40
	12,602	600	350	47.6	27.8	1.98
	7,899	157	137	19.9	17.3	.26
	7,000	270	245	38.6	35.0	.36
	3,709	28	40	7.6	10.8	-.32
1941 ¹²	47,835	805	784	16.8	16.4	.04
1942 ¹³	48,877	871	568	17.8	11.6	.62
1944 ¹³	60,655	1,242	672	20.5	11.1	.94
1945 ¹³	61,060	1,176	676	19.3	11.1	.82
1946 ¹³	62,593	1,415	629	22.6	10.0	1.26
1947 ¹³	63,823	1,434	706	22.5	11.1	1.14
1948 ¹³	65,546	1,281	715	19.5	10.9	.86
1949 ¹³	67,317	1,808	690	26.9	8.9	1.80
1950 ¹³	69,374	2,034	685	29.3	9.9	1.94
1951 ¹³	70,600	2,241	743	31.7	10.5	2.12
1952 ¹³	71,901	2,423	674	33.7	9.4	2.43
1953 ¹³	73,398	2,479	639	33.8	8.7	2.51
1954 ¹³	75,296	2,532	573	33.6	7.6	2.60
1955 ¹⁴	77,164	2,661	585	34.4	7.6	2.68
1956 ¹⁴	79,309	3,089	540	39.0	6.8	3.22
1957 ¹⁴	81,700	3,160	616	38.7	7.5	3.12
1944-46 average	61,400	1,278	659	20.8	10.7	1.01
1948-52 average	68,950	1,957	683	28.4	9.9	1.85
1953-57 average	77,370	2,784	591	36.0	7.6	2.84

¹ An attempt has been made to include in this table all reported vital statistics for the Navaho population for the years between 1868 and 1900, and for the years between 1941 and 1957. Data for the intervening period were selected to illustrate the reporting of vital events among the Navaho at the time. The reports that were omitted do not differ materially from those that were included; the illustrations that have been selected should suffice to indicate the extreme variability of the reporting of Navaho vital phenomena during this period.

² The population totals shown for the years 1941 to 1956 are derived from the reported crude birth rates. These totals are nevertheless given in exact figures because the crude birth rates were originally reported to three decimal places. Some of the totals include non-Navaho Indians; in such cases the number and tribal affiliation of the Indians included are specified in the footnotes for the given year.

³ The formulas for calculating the crude rates of birth, death, and natural increase are given in the Appendix. There is no assurance, with the above data, that the population total pertains exactly to the mid-point of the year specified; this has been assumed to be the case in the absence of more precise information. Since an error of 1 percent in the population base produces an error of 0.2-0.5 in the rates, their approximate nature must be emphasized.

⁴ Bureau of Indian Affairs, 1884, p. 294.

⁵ Bureau of Indian Affairs, 1887, pp. 171-177, 348 ff.

⁶ Bureau of Indian Affairs, 1889, p. 506.

⁷ Bureau of Indian Affairs, 1890, p. 161. The population figure is that of the 1890 census.

⁸ Bureau of Indian Affairs, 1912, table 19. The total of 4,068 comprises 2,000 Navahos and 2,068 Hopis; the total of 6,535 comprises 6,131 Navahos, 204 Hopis, and 200 Paiutes. After 1911, Navaho population and vital statistics were reported independently by each subagency. These subagencies are not identified here, since the purpose of the figures presented is to illustrate the nature of the reporting of vital events, and not to describe these events themselves.

⁹ Bureau of Indian Affairs, 1916, table 14. The total of 4,203 comprises 2,000 Navahos and 2,203 Hopis; the total of 6,550 comprises 6,087 Navahos, 273 Hopis, and 190 Paiutes.

¹⁰ Bureau of Indian Affairs, 1920, table 15. The total of 4,227 comprises 2,000 Navahos and 2,227 Hopis; the total of 6,300 comprises 5,842 Navahos, 288 Hopis, and 170 Paiutes.

¹¹ Bureau of Indian Affairs, 1928, table 4. The total of 5,224 comprises 2,750 Navahos and 2,474 Hopis; the total of 7,899 includes an unspecified number of Hopis and Paiutes, probably totaling less than 500.

Footnote continued on following page.

Footnotes to table 29, continued.

¹² From the files of the U.S. Public Health Service, Window Rock, Ariz. Through the courtesy of Dr James E. Bondurant, area health director.

¹³ Young, 1956, p. 154. The data for the years 1944 through 1948 are also presented in Bureau of Indian Affairs, 1950, and Felsman, 1951. The data for the years 1948 through 1952 were also compiled by Drs. Robert Smith, Clarence Salsbury, and Alexander Gilliam with the assistance of J. Nixon Hadley and Francis Felsman, and are in Smith et al., 1956.

¹⁴ Young, 1958, p. 339. The population totals given for the years 1955 and 1956 were obtained by taking the average of the number derived from the reported number and rate of births and the number derived from the reported number and rate of deaths for the given year. The population total for 1957 is the estimate of the U.S. Public Health Service, Division of Indian Health, Albuquerque Office, as of July 1, 1957.

the base population is small, considerable variation in vital rates could be attributed to chance factors. However, where the births and deaths are reported in round numbers, these numbers are at best crude estimates and at worst, purely fictitious.

The average annual rates of natural increase that are derived from reported Navaho population totals at selected years are useful in interpreting the statistics on reported births and deaths, since they reflect the underlying dynamics of Navaho population growth at different periods in the past. Although these average annual rates are themselves subject to considerable variation because of uncertainty with respect to the total number of Navahos at any given time, it is possible to establish a range of plausible rates of natural increase for different periods. Given an approximate rate of natural increase, it is possible to indicate plausible combinations of crude birth and crude death rates which might account for the indicated increase.

On the basis of the data given in table 30 the following range of probable growth rates can be suggested: For the period from 1870 to 1900, the average annual rate of natural increase appears to lie somewhere between 1.5 and 2.0 percent; for 1900 to 1930 the rate appears to lie between 1.75 and 2.25 percent; for 1920 to 1950 the rate appears to lie between 2.4 and 2.8 percent; and for the period since 1950 it appears to lie between 2.4 and 3.3 percent.

It is possible to infer a very wide range of vital rates which, in combination, would produce rates of increase which fall within the above ranges. For example, for the period 1870 to 1900, a crude birth rate of 40 and a crude death rate of 20 per 1,000 would produce a crude rate of natural increase of 2 percent per year. By contrast, a crude birth rate of 50, in combination with a crude death rate of 35 per 1,000, would produce a crude rate of natural increase of 1.5 percent per year. Either set of assumptions would be consistent with the assumed range of natural increase for this period.³

³ No claim is made for the accuracy of the vital rates that are postulated in this analysis. Their sole intended function is to illustrate the extreme unreliability of the reported vital data on the Navaho population. In postulating these ranges, however, an attempt has been made to approximate the most plausible magnitudes for the different periods. The reader should note, for example, that the postulated rates of natural increase are supported by the general trends in reported Navaho population totals at different times. Similarly, the minimum postulated crude birth rate of 40 per 1,000 is supported by the fact that the reported crude birth rate for the Navaho population in 1956 and 1957 approaches this figure. If we assume that Navaho births are not yet completely registered, and that

TABLE 30.—Average annual rates of natural increase (r) for selected Navaho populations and periods—1849-1962^{1,2}

Period	Midpoint	P_n	P_o	(nr)	n	r (percent)
1849 to 1869 ³	1859	10,000	9,000	0.10536	20	0.53
1869 to 1890	1879 to 1880	17,204	10,000	.54256	21	2.58
1869 to 1900 ⁴	1884 to 1885	21,826	12,000	.59819	31	1.93
	1884 to 1885	21,826	10,000	.78052	31	2.52
1869 to 1910 ⁵	1889 to 1890	25,000	12,000	.73397	41	1.79
	1889 to 1890	22,455	10,000	.80893	41	1.97
1890 to 1900	1895	21,826	17,204	.23796	10	2.38
1869 to 1930	1890 to 1900	39,064	10,000	1.36262	60.75	2.24
1890 to 1910	1900	22,455	17,204	.26638	20	1.33
1900 to 1910	1905	22,455	21,826	.02841	10	.28
1890 to 1930	1910	39,064	17,204	.82006	39.75	2.06
1900 to 1920	1910	30,473	21,826	.33374	20	1.67
1910 to 1920	1915	30,473	22,455	.30533	10	3.05
1900 to 1930	1915	39,064	21,826	.58210	29.75	1.96
1890 to 1950	1920	64,274	17,204	1.31801	59.75	2.20
1900 to 1940	1920	48,722	21,826	.80303	40	2.01
1910 to 1930 ⁵	1920	39,064	25,000	.44633	19.75	2.26
	1920	39,064	22,455	.55369	19.75	2.80
1900 to 1950	1925	64,274	21,826	1.08005	49.75	2.17
1910 to 1940	1925	48,722	22,455	.77462	30	2.58
1910 to 1950	1930	64,274	22,455	1.05164	39.75	2.64
1920 to 1940	1930	48,722	30,473	.46929	20	2.35
1920 to 1950	1935	64,274	30,473	.74631	29.75	2.61
1930 to 1950 ⁶	1940	64,274	39,064	.49795	20	2.49
	1940	69,167	40,858	.52642	20	2.63
1930 to 1957	1943 to 1944	81,700	39,064	.73785	27.25	2.71
1930 to 1962	Feb. 1946	93,377	40,858	.82654	31.7	2.61
1940 to 1950	1945	64,274	48,722	.27702	9.75	2.84
1940 to 1957	1948 to 1949	81,700	48,722	.51692	17	3.04
1950 to 1957 ⁷	1953 to 1954	81,700	64,274	.23990	7.25	3.31
	1953 to 1954	81,700	69,167	.16653	7	2.38
1953 to 1957 ⁸	1955	81,700	73,400	.10713	4	2.68
1950 to 1962 ⁹	Feb. 1956	93,377	69,167	.30010	11.7	2.66

¹ The population totals used in this table were selected from those listed in table 27, p. 136. The source of each total is presented in the footnotes to that table. All of the totals are assumed to pertain to the midpoint of the specified years, excepting the totals reported in the censuses of 1930, 1940, 1950, and 1960; which were assumed to pertain to April 1 of the respective year.

² See appendix for means of obtaining average annual rate of natural increase.

³ The population totals selected for this period represent an approximate average of the widely differing estimates reported for the years 1849 and 1869.

⁴ In this calculation, a higher estimate of 12,000 is used for the population in 1869. A glance at the totals given in table 27 indicates that this higher figure still falls well within the range of reported estimates for that year. This higher figure for 1869 also produces more plausible rates of natural increase for the decades immediately following. By the same token, however, it suggests that the 1849 figure of 9,000 is too low.

⁵ In this calculation, the reported total for 1910 was arbitrarily raised to 25,000. This adjustment is in line with the general opinion expressed to the effect that the 1910 census seriously underenumerated the Navaho population. In Bureau of the Census, 1915, p. 78, Roland Dixon expressed the view that the actual number of Navahos in 1910 was "somewhere between" the Bureau of Indian Affairs figure of 28,000 and the Bureau of the Census figure of 22,455. The higher figure for 1910, like its counterpart for 1869, produces more plausible rates of natural increase during the following two decades.

⁶ The first set of totals for the period 1930-50 are those reported by the respective censuses. The second set of totals for this period are those reported by the Bureau of Indian Affairs.

⁷ The total given for 1957 is from an estimate prepared by the Albuquerque Office of the Division of Indian Health, U.S. Public Health Service.

⁸ The totals used for this period are estimates prepared by the Albuquerque Office of the Division of Indian Health, U.S. Public Health Service.

⁹ The 1961-62 estimate is from Young, 1961, p. 331. The 1930 and 1950 estimates are those of the Navajo Agency, derived from the official census counts of April, but adjusted to include persons presumably missed in those enumerations.

Navaho fertility has not increased in recent years, the postulated minimum rate appears to be sensible. The postulated maximum crude birth rate of 50 per 1,000 does not enjoy the same degree of empirical support. However, it should be noted that the crude birth rates observed among Navahos in the Chinle-Many Farms area from 1955 to 1959 averaged 49.5 per 1,000. These data were supplied through the courtesy of Bernice W. Loughlin, Public Health Service, Navajo-Cornell Field Health Project, Chinle, Ariz. The postulated crude death rates are derived from the limits imposed by the given rates of fertility and natural increase in each case.

It is interesting to note that even with the wide allowances that are provided in the postulated vital rates for each period, none of the four crude birth rates derived from reported data between 1870 and 1900 falls within the postulated range of 40 to 50 per 1,000. Of the four corresponding crude death rates reported for this period (table 29), the rate for 1884 falls just above the postulated minimum of 20 per 1,000, while the rate for 1889 falls just above the postulated maximum of 35 per 1,000. The other two crude death rates fall far wide of these limits.

For the period 1900 to 1930, definite ranges can be postulated. At the lower extreme, a crude birth rate of 40, and a crude death rate of 17.5 per 1,000 would produce a crude rate of natural increase of 2.25 percent per year. At the upper extreme, rates of 50 and 32.5, respectively, would produce a crude rate of natural increase of 1.75 percent per year. Of the 19 reported crude birth rates for the Navaho population in this period (as shown in table 29), only 3 fall within the postulated range of 40 to 50 per 1,000. Of the 19 reported crude death rates for the same period, only 7 are seen to fall within the even wider range of 17.5 to 32.5 that was postulated for this period.

For the period 1930 to 1950, we can postulate, at the lower extreme, a crude birth rate of 40, and a crude death rate of 12 per 1,000, giving a crude rate of natural increase of 2.8 percent per year. The corresponding upper limits would consist of rates of 50 and 26, respectively, implying a crude rate of natural increase of 2.4 percent per year. If we include the average vital rates for the years 1944-46 and 1948-52, we have a total of 11 sets of vital rates reported for the Navaho during this period. All of the reported crude birth rates (table 29) are seen to fall well below the postulated minimum of 40 per 1,000. Similarly, all but one of the 11 reported crude death rates fall below the postulated minimum rate of 12 per 1,000.⁴

Finally, for the period since 1950, we can postulate as lower limits a crude birth rate of 40, and a crude death rate of 7 per 1,000, giving a crude rate of natural increase of 3.3 percent per year. At the upper limit, we can postulate rates of 50 and 26 per 1,000 respectively, implying a crude rate of natural increase of 2.4 percent per year. All of the reported crude birth rates for this period fall below the postulated minimum, although the rates reported for 1956 and 1957 naturally approach the minimum. The reported death rates for this period, however, fall within the very wide limits of 7 to 26 per 1,000 (except for the rate reported in 1956). These reported death rates,

⁴ One of the earliest studies of Navaho mortality in the modern period was a survey of about 4,000 Navahos on the reservation, conducted by Dr. Solon T. Kimball during the period of the Human Dependency Survey in 1938-39. Dr. Kimball (1940, pp. 2-3) obtained a crude birth rate of 37.6 and a crude death rate of 13.6 among this population at this time and anticipated the growth rates recognized among the Navaho after World War II.

however, tend to cluster toward the lower limit of this postulated range.

The general impression that is gained from these comparisons is that the vital rates derived from reported births and deaths for the Navaho population are generally unreliable, at least until the past few years. While the crude death rates assume a fairly consistent pattern after World War II, the crude birth rates appear to remain seriously deficient at least until 1956.

Further indication of the unreliability of the reporting of annual births among the Navaho can be seen in a comparison of child-woman and infant-child ratios as calculated from the same 31 age distributions that are given in table 31. The child-woman ratios for all 31 of these age distributions, together with infant-child ratios for 20 of the 31, are given in table 32.

If we consider, first, the ratios for the Navaho populations prior to 1920, we find a child-woman ratio around 1,000 in 4 of the 6 available Navaho age distributions. Both of the earlier Ramah ratios are over 1,000, while those of the Fort Defiance and San Juan Agency Navahos in 1915 and 1916, respectively, approach 1,000. The reader should note that the infant-child ratios for the latter two populations are low relative to the "expected" ratio somewhat in excess of 20. If the number of infants reported in these latter two populations was adjusted so as to produce the "expected" ratio of infants to children under 5, the resultant child-woman ratios would also exceed 1,000.⁵

The remaining two ratios for this period are considerably lower than the four discussed above. That for the Navaho population in the 1910 census is 799, while that of the Canoncito and Puertocito bands in 1915-20 is lower than any other Navaho child-woman ratios excepting those obtained from the enrolled population in 1957. The general impression to be gained from these ratios, most of which fall within a range from 800 to 1,000, is that the Navaho population was experiencing high fertility at this time.⁶

⁵ An explanation of the expectation that the ratio of infants to children under 5 should, in the absence of underreporting of births, be at least 20 percent, is provided in footnote 3, table 32.

⁶ A simple calculation serves to illustrate this conclusion. First, the number of women aged 15 to 49 (as shown in table 32) amount to 20 to 25 percent of the total population (as shown in table 28) for the Navaho populations in this period. Second, a conservative estimate for the mortality of Navaho children under 5 at this time would suggest that their number would amount, at most, to about 10 percent of the total number of live births occurring during the preceding 5 years. Third, given a child-woman ratio of 900, 1,000 women would then have experienced approximately 1,000 live births during the preceding 5 years, for an average of 200 births per year. Fourth, assuming that these women constitute 22.5 percent of the total population, the resultant crude birth rate of this population comes to 45 per 1,000. Even allowing for a substantial margin of error in these calculations, the implied crude birth rate would probably fall within the range of 40 to 50 per 1,000.

Age group (in years)	Ramah Navaho, 1900-1918 *				Navaho Indian population, 1910 *				Total Indian population, continental United States, 1910 *			
	Both sexes		Males		Females		Both sexes		Males		Females	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages.....	4,978	100.0	2,553	51.5	2,415	48.5	22,377	100.0	11,305	50.5	11,072	49.5
Under 5.....	1,028	20.7	537	10.8	491	9.9	3,916	17.5	2,000	8.9	1,916	8.6
Under 1.....	221	4.4	113	2.3	108	2.1	-----	-----	-----	-----	-----	-----
1 to 4.....	807	16.3	424	8.5	383	7.8	-----	-----	-----	-----	-----	-----
5 to 9.....	867	17.4	448	9.0	419	8.4	3,739	16.7	1,916	8.6	1,823	8.1
10 to 14.....	743	14.9	391	7.8	352	7.1	2,942	13.2	1,512	6.8	1,430	6.4
15 to 19.....	564	11.3	300	6.0	264	5.3	2,409	11.2	1,254	5.6	1,244	5.6
20 to 24.....	431	8.6	225	4.5	206	4.1	1,770	7.9	854	3.8	916	4.1
25 to 29.....	306	6.2	157	3.2	149	3.0	1,547	6.9	759	3.4	788	3.5
30 to 34.....	229	4.6	110	2.2	119	2.4	1,196	5.4	554	2.5	642	2.9
35 to 39.....	175	3.5	78	1.6	97	1.9	1,268	5.7	651	2.9	617	2.8
40 to 44.....	159	3.2	71	1.4	88	1.8	920	4.1	467	2.1	453	2.0
45 to 49.....	118	3.3	61	1.2	57	1.1	548	2.5	305	1.4	243	1.1
50 to 54.....	105	2.1	54	1.1	51	1.0	458	2.1	245	1.1	213	1.0
55 to 59.....	82	1.6	42	.8	40	.8	351	1.5	184	.8	167	.7
60 to 64.....	52	1.1	28	.6	24	.5	320	1.4	166	.7	154	.7
65 to 69.....	39	.8	21	.4	18	.4	312	1.4	161	.7	151	.7
70+.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
70 to 74.....	15	.3	10	.2	5	.7	235	1.1	111	.5	124	.6
75 to 79.....	65	1.3	30	.6	35	.7	356	1.5	165	.7	191	.8
Median age.....	-----	-----	13.80	-----	14.23	-----	-----	-----	15.89	-----	16.48	-----

See footnotes at end of table.

Age group (in years)	Ramah Navaho, 1920-43 ^a						Total Indian population, continental United States, 1930 ¹⁰						Navaho Indian population, 1930 ¹¹					
	Both sexes		Males		Females		Both sexes		Males		Females		Both sexes		Males		Females	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages.....	13,972	100.0	6,774	48.5	7,198	51.5	331,948	100.0	170,121	51.2	161,827	48.8	39,026	100.0	19,746	50.6	19,280	49.3
Under 5.....	2,544	18.2	1,200	8.6	1,344	9.6	46,080	14.1	23,447	7.1	23,233	7.0	6,578	16.8	3,329	8.5	3,249	8.3
Under 1.....	508	4.1	267	1.9	301	2.2	9,296	2.8	4,681	1.4	4,615	1.4	1,116	2.8	569	1.4	547	1.4
1 to 4.....	1,976	14.1	933	6.7	1,043	7.4	37,384	11.3	18,766	5.7	18,618	5.6	5,462	14.0	2,760	7.1	2,702	6.9
15 to 9.....	2,105	15.1	992	7.1	1,113	8.0	46,736	14.0	23,434	7.0	23,302	7.0	6,443	16.5	3,279	8.4	3,164	8.1
10 to 14.....	1,740	12.4	799	5.7	941	6.7	39,456	11.8	20,028	6.0	19,428	5.8	4,721	12.1	2,422	6.2	2,299	5.9
25 to 19.....	1,507	10.7	690	4.9	817	5.8	36,219	10.9	18,154	5.5	18,065	5.4	4,267	11.0	2,090	5.4	2,177	5.6
20 to 24.....	1,282	9.2	597	4.3	685	4.9	28,843	8.7	14,697	4.4	14,146	4.3	3,880	10.0	1,870	4.8	2,010	5.2
25 to 20.....	1,058	7.5	520	3.7	538	3.8	23,491	7.0	12,127	3.6	11,364	3.4	2,789	7.2	1,386	3.6	1,403	3.6
20 to 29.....	866	6.2	458	3.3	408	2.9	19,309	5.8	10,032	3.0	9,277	2.8	2,328	5.9	1,194	3.0	1,134	2.9
30 to 34.....	679	4.8	382	2.7	297	2.1	17,941	5.4	9,404	2.8	8,537	2.6	1,753	4.5	918	2.4	835	2.1
35 to 39.....	582	4.0	307	2.2	255	1.8	15,090	4.6	7,881	2.4	7,209	2.2	1,547	4.0	807	2.1	740	1.9
40 to 44.....	469	3.3	255	1.8	214	1.5	13,416	4.0	7,131	2.1	6,285	1.9	1,116	2.9	584	1.5	532	1.4
45 to 49.....	351	2.5	182	1.3	169	1.2	11,623	3.5	6,272	1.9	5,351	1.6	937	2.4	499	1.3	438	1.1
50 to 54.....	226	1.6	111	.8	115	.8	9,236	2.7	5,118	1.5	4,118	1.2	741	1.9	386	1.0	355	.9
55 to 59.....	184	1.3	83	.6	101	.7	7,551	2.2	4,060	1.2	3,491	1.0	754	1.9	389	1.0	365	.9
60 to 64.....	140	1.0	72	.5	68	.5	5,840	1.7	3,104	.9	2,736	.8	400	1.1	219	.6	181	.5
65 to 69.....	112	.8	62	.4	50	.4	4,190	1.2	2,153	.6	2,037	.6	264	.6	128	.3	136	.3
70 to 74.....	147	1.0	64	.4	83	.6	6,827	1.9	3,079	.9	3,248	1.0	508	1.3	246	.6	292	.7
Median age.....	17.87				16.23				20.00		19.14				17.02		17.13	

See footnotes at end of table.

TABLE 31.—*Age distributions for selected Indian and Navaho Indian populations—1860-1961*—Continued

Age group (in years)	Navaho Indian population, 1935-38 ¹²						Enrolled Navaho population, 1939 original ¹³						Enrolled Navaho population, 1939 supplementary ¹⁴					
	Both sexes			Males			Females			Both sexes			Males			Females		
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages.....	28,492	100.0	14,270	50.2	14,222	49.8	5,248	100.0	2,648	51.2	2,554	48.8	5,528	100.0	2,815	50.9	2,713	49.1
Under 5.....	4,906	17.2	2,472	8.7	2,434	8.5	606	11.5	315	6.0	291	5.5	800	14.5	410	7.4	390	7.1
Under 1.....	959	3.3	489	1.7	470	1.6	114	2.2	60	1.1	54	1.1	154	2.8	79	1.4	75	1.4
1 to 4.....	3,947	13.9	1,953	7.0	1,964	6.9	492	9.3	255	4.9	237	4.4	646	11.7	331	6.0	315	5.7
5 to 9.....	4,864	17.1	2,444	8.6	2,420	8.5	659	12.6	334	6.4	325	6.2	731	13.3	368	6.7	363	6.6
10 to 14.....	3,805	13.3	1,978	6.9	1,827	6.4	731	13.9	374	7.1	357	6.8	742	13.4	376	6.8	365	6.6
15 to 19.....	3,106	10.9	1,495	5.2	1,611	5.7	663	12.6	356	6.8	307	5.8	666	12.0	356	6.4	310	5.6
20 to 24.....	2,555	9.0	1,231	4.3	1,324	4.7	513	9.8	266	5.1	247	4.7	513	9.3	266	4.8	247	4.5
25 to 29.....	1,953	6.9	932	3.3	1,021	3.6	478	9.1	236	4.5	242	4.6	478	8.7	236	4.3	242	4.4
30 to 34.....	1,568	5.5	742	2.6	826	2.9	386	7.4	198	3.8	188	3.6	386	7.0	198	3.6	188	3.4
35 to 39.....	1,282	4.5	658	2.3	624	2.2	292	5.6	135	2.6	157	3.0	292	5.2	135	2.4	157	2.8
40 to 44.....	1,056	3.7	558	1.9	518	1.8	219	4.2	113	2.2	106	2.0	219	3.9	113	2.0	106	1.9
45 to 49.....	895	3.1	456	1.6	439	1.5	170	3.3	88	1.7	82	1.6	170	3.1	88	1.6	82	1.5
50 to 54.....	726	2.5	402	1.4	324	1.1	130	2.5	72	1.4	58	1.1	130	2.3	72	1.3	58	1.0
55 to 59.....	510	1.8	273	1.0	237	.8	110	2.0	55	1.0	55	1.0	110	2.0	55	1.0	55	1.0
60 to 64.....	453	1.6	241	.9	212	.7	84	1.6	44	.8	40	.8	84	1.5	44	.8	40	.7
65 to 69.....	409	1.4	221	.8	188	.6	77	1.5	42	.8	35	.7	77	1.4	42	.8	35	.6
70 to 74.....	187	.7	87	.3	100	.4	51	1.0	22	.4	29	.6	51	.9	22	.4	29	.5
75 to 79.....	100	.3	47	.1	53	.2	24	.4	11	.2	13	.2	24	.4	11	.2	13	.2
Median age.....	217	.8	107	.4	110	.4	79	1.4	34	.6	45	.8	79	1.4	34	.6	45	.8
			15.81		16.33				19.48		20.04				18.57		18.82	

Age group (in years)	Estimated Navaho Indian population, 1945 ¹³						Navahos residing on reservation, 1950 ¹⁶						Total Indian population, continental United States, 1950 ¹⁷					
	Both sexes		Males		Females		Both sexes		Males		Females		Both sexes		Males		Females	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages.....	61,002	100.0	30,897	50.6	20,105	49.4	54,113	100.0	26,981	49.9	27,132	50.1	342,226	100.0	178,172	52.1	104,054	47.9
Under 5.....	10,075	16.5	5,068	8.3	5,007	8.2	8,236	17.0	4,673	8.6	4,563	8.4	51,988	15.2	26,386	7.7	25,602	7.5
Under 1.....	2,137	3.5	1,099	1.8	1,038	1.7												
1 to 4.....	7,938	13.0	3,969	6.5	3,969	6.5												
5 to 9.....	8,916	14.6	4,458	7.3	4,458	7.3	8,787	16.2	4,377	8.1	4,410	8.1	44,301	12.9	23,305	6.5	20,006	6.4
10 to 14.....	8,182	13.4	4,152	6.8	4,030	6.6	7,300	13.5	3,785	7.0	3,515	6.5	43,575	12.7	23,321	6.8	20,254	5.9
15 to 19.....	7,633	12.5	3,725	6.1	3,908	6.4	6,109	11.3	2,934	5.4	3,175	5.9	33,829	9.8	16,912	4.9	16,917	4.9
20 to 24.....	4,091	6.7	1,954	3.2	2,137	3.5	4,833	8.9	2,206	4.2	2,627	4.7	30,122	8.8	16,357	4.8	13,765	4.0
25 to 29.....	4,580	7.5	2,198	3.6	2,382	3.9	3,424	6.3	1,654	3.0	1,770	3.3	23,510	6.8	12,080	3.5	11,430	3.3
30 to 34.....	3,735	6.1	1,893	3.1	1,842	3.0	2,703	5.0	1,272	2.4	1,431	2.6	19,574	5.7	9,929	2.9	9,645	2.8
35 to 39.....	3,176	5.2	1,649	2.7	1,527	2.5	2,456	4.5	1,188	2.2	1,268	2.3	18,917	5.5	9,709	2.8	9,208	2.7
40 to 44.....	2,564	4.4	1,343	2.2	1,221	2.0	1,987	3.7	950	1.8	1,037	1.9	15,489	4.6	8,044	2.4	7,445	2.2
45 to 49.....	2,076	3.4	1,099	1.8	977	1.6	1,853	3.4	942	1.7	911	1.7	14,340	4.2	7,799	2.3	6,541	1.9
50 to 54.....	1,649	2.7	916	1.5	733	1.2	1,309	2.4	703	1.3	606	1.1	11,551	3.3	6,360	1.8	5,191	1.5
55 to 59.....	1,222	2.0	672	1.1	550	.9	1,090	2.0	608	1.1	482	.9	9,292	2.7	5,216	1.5	4,076	1.2
60 to 64.....	977	1.6	550	.9	427	.7	864	1.5	404	.8	400	.7	7,694	2.2	4,263	1.2	3,431	1.0
65 to 69.....	793	1.3	427	.7	366	.6	811	1.5	430	.8	381	.7	7,185	2.1	3,846	1.1	3,339	1.0
70 to 74.....																		
75+	732	1.2	427	.7	305	.5	533	1.0	276	.5	257	.5	4,517	1.3	2,431	.7	2,086	.6
Median age.....	671	1.1	366	.6	305	.5	818	1.5	429	.8	389	.7	6,432	1.9	3,045	1.0	3,324	.9
			17.38		17.03		16.12		16.12		16.70				20.05		19.19	

See footnotes at end of table.

TABLE 31.—Age distributions for selected Indian and Navaho Indian populations—1860-1961¹—Continued

Age group (in years)	Navajo Agency area population, 1950 ¹³						Navajo Agency population in Arizona and Utah, 1950 ¹³						Navajo Agency area population in New Mexico, 1950 ¹³					
	Both sexes			Males			Females			Both sexes			Males			Females		
	Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent	
All ages.....	64,274	100.0	32,444	50.5	31,830	49.5	39,886	100.0	20,117	50.4	19,769	49.6	24,388	100.0	12,327	50.5	12,061	49.5
Under 5.....	10,934	17.0	5,561	8.6	5,373	8.4	6,871	17.3	3,494	8.8	3,377	8.5	4,063	16.7	2,067	8.5	1,996	8.2
Under 1.....																		
1 to 4.....																		
5 to 9.....	10,160	15.8	5,021	7.8	5,139	8.0	6,362	15.9	3,132	7.8	3,230	8.1	3,798	15.5	1,889	7.7	1,909	7.8
10 to 14.....	8,661	13.5	4,535	7.1	4,126	6.4	5,432	13.6	2,837	7.1	2,595	6.5	3,229	13.3	1,698	7.0	1,531	6.3
15 to 19.....	7,922	10.9	3,403	5.3	3,619	5.6	4,260	10.7	2,100	5.3	2,160	5.4	2,762	11.3	1,303	5.3	1,459	6.0
20 to 24.....	5,976	8.8	2,703	4.2	2,973	4.6	3,480	8.7	1,647	4.1	1,833	4.6	2,196	9.0	1,056	4.3	1,140	4.7
25 to 29.....	4,536	6.6	2,105	3.3	2,131	3.3	2,572	6.5	1,269	3.2	1,303	3.3	1,664	6.8	836	3.4	828	3.4
30 to 34.....	3,324	5.2	1,594	2.5	1,730	2.7	2,024	5.0	965	2.4	1,059	2.6	1,360	5.4	629	2.6	671	2.8
35 to 39.....	3,015	4.7	1,510	2.4	1,505	2.3	1,807	4.5	887	2.2	920	2.3	1,208	5.0	623	2.6	585	2.4
40 to 44.....	2,453	3.8	1,223	1.9	1,230	1.9	1,499	3.7	740	1.8	759	1.9	954	3.9	483	2.0	471	1.9
45 to 49.....	2,197	3.4	1,153	1.8	1,044	1.6	1,351	3.4	716	1.8	635	1.6	846	3.5	437	1.8	409	1.7
50 to 54.....	1,644	2.6	897	1.4	747	1.2	1,024	2.6	557	1.4	467	1.2	620	2.5	340	1.4	280	1.1
55 to 59.....	1,289	2.0	762	1.2	527	.8	810	2.0	479	1.2	331	.9	479	2.0	283	1.2	196	.8
60 to 64.....	1,029	1.6	572	.9	457	.7	649	1.6	352	.9	297	.7	380	1.6	220	.9	160	.7
65 to 69.....	957	1.5	515	.8	442	.7	627	1.6	345	.9	282	.7	330	1.4	170	.7	160	.7
70 to 74.....	630	1.0	334	.5	305	.5	411	1.0	217	.5	194	.5	228	.9	117	.5	111	.4
75 to 79.....	1,038	1.6	566	.9	452	.7	707	1.8	380	1.0	327	.8	331	1.3	176	.7	155	.6
Median age.....			16.62		16.76				16.42		16.38				16.96		17.01	

Age group (in years)	Fort Defiance subagency Navaho population, 1956-57 ¹⁹						Estimated Navaho Indian population, 1957 ²⁰						Enrolled Navaho population, 1957 ²¹					
	Both sexes			Males			Females			Both sexes			Males			Females		
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages.....	2,283	100.0	1,129	49.5	1,154	50.5	81,700	100.0	40,638	49.7	41,062	50.3	7,720	100.0	3,869	50.1	3,851	49.9
Under 5.....	388	17.0	197	8.6	191	8.4	14,368	17.6	7,285	8.9	7,083	8.7	512	6.6	251	3.2	261	3.4
Under 1.....	63	2.8	29	1.3	34	1.5	---	---	---	---	---	---	15	.2	8	.1	7	.1
1 to 4.....	325	14.2	168	7.3	157	6.9	---	---	---	---	---	---	497	6.4	243	3.1	254	3.3
5 to 9.....	389	17.1	180	7.9	209	9.2	13,068	15.9	6,489	7.9	6,579	8.0	850	11.0	439	5.7	411	5.3
10 to 14.....	346	15.2	164	7.2	182	8.0	10,278	12.6	5,322	6.5	4,956	6.1	907	11.7	436	5.6	471	6.1
15 to 19.....	287	12.6	150	6.6	137	6.0	8,820	10.8	4,178	5.1	4,642	5.7	747	9.7	363	4.7	384	5.0
20 to 24.....	182	8.0	89	3.9	93	4.1	7,455	9.1	3,536	4.3	3,919	4.8	716	9.2	372	4.8	344	4.4
25 to 29.....	138	6.1	66	2.9	72	3.2	5,291	6.5	2,549	3.1	2,742	3.4	727	9.4	359	4.6	368	4.8
30 to 34.....	104	4.6	45	2.0	59	2.6	4,170	5.1	1,953	2.4	2,217	2.7	612	8.3	343	4.4	269	3.9
35 to 39.....	114	5.0	59	2.6	55	2.4	3,795	4.6	1,827	2.2	1,968	2.4	526	6.8	274	3.5	252	3.3
40 to 44.....	88	3.9	45	2.0	43	1.9	3,059	3.8	1,403	1.8	1,596	2.0	446	5.8	228	3.0	218	2.8
45 to 49.....	79	3.5	36	1.6	43	1.9	2,880	3.5	1,407	1.8	1,413	1.7	424	5.5	211	2.7	213	2.8
50 to 54.....	55	2.4	31	1.4	24	1.0	2,043	2.5	1,094	1.3	949	1.2	305	3.9	141	1.8	165	2.1
55 to 59.....	36	1.6	22	1.0	14	.6	1,709	2.1	961	1.2	748	.9	237	3.0	118	1.5	119	1.5
60 to 64.....	28	1.2	17	.7	11	.5	1,370	1.7	733	.9	637	.8	162	2.1	86	1.1	70	1.0
65 to 69.....	27	1.1	17	.7	10	.4	2,291	1.5	685	.8	606	.7	148	1.9	79	1.0	69	.9
70 to 74.....	11	.5	6	.3	5	.2	842	1.0	434	.5	408	.5	98	1.2	49	.6	49	.6
75+.....	11	.5	5	.2	6	.3	1,261	1.5	662	.8	599	.7	272	3.6	120	1.6	152	2.0
Median age.....	15.77	---	15.77	---	14.86	---	16.46	---	16.46	---	17.06	---	26.02	---	26.02	---	25.75	---

See footnotes at end of table.

TABLE 31.—*Age distributions for selected Indian and Navaho Indian populations—1860-1901*¹—Continued

Age group (in years)	Enrolled Navaho population in Arizona and Utah, 1957 ²						Enrolled Navaho population in New Mexico, 1957 ²						Total Indian population, continental United States, 1930 ²					
	Both sexes			Males			Females			Both sexes			Males			Females		
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages	4,147	100.0	2,077	50.1	142	49.9	2,070	49.9	3,573	100.0	1,792	50.2	1,781	49.8	548,228	100.0	272,702	49.9
Under 5	280	6.7	138	3.3	142	3.4	138	3.3	232	6.5	113	3.2	119	3.3	91,287	16.7	45,381	8.3
Under 1	7	2	3	1	4	1	4	1	8	3	5	2	3	1				
1 to 4	273	6.5	135	3.2	138	3.3	138	3.3	224	6.2	108	3.0	116	3.2				
5 to 9	468	11.3	240	5.8	228	5.5	228	5.5	382	10.7	199	5.6	183	5.1	75,947	13.9	37,784	6.9
10 to 14	501	12.0	226	5.4	275	6.6	275	6.6	406	11.4	210	5.9	193	5.5	63,499	11.6	32,132	5.9
15 to 19	399	9.7	197	4.8	202	4.9	202	4.9	348	9.7	166	4.6	182	5.1	49,897	9.1	25,615	4.7
20 to 24	373	9.0	199	4.8	174	4.2	174	4.2	343	9.6	173	4.8	170	4.8	39,667	7.3	20,032	3.7
25 to 29	384	9.3	195	4.7	189	4.6	189	4.6	343	9.6	164	4.6	179	5.0	33,023	6.0	16,312	3.0
30 to 34	347	8.4	194	4.7	153	3.7	153	3.7	295	8.3	149	4.2	146	4.1	30,122	5.5	14,630	2.7
35 to 39	279	6.7	138	3.3	141	3.4	141	3.4	247	6.9	136	3.8	111	3.1	28,389	5.2	14,064	2.6
40 to 44	245	5.9	126	3.0	119	2.9	119	2.9	201	5.6	102	2.8	99	2.8	22,929	4.2	11,559	2.1
45 to 49	235	5.6	121	2.9	114	2.7	114	2.7	189	5.3	90	2.5	99	2.8	21,711	4.0	10,878	2.0
50 to 54	159	3.8	72	1.7	87	2.1	87	2.1	147	4.1	69	1.9	78	2.2	20,767	3.8	10,310	1.9
55 to 59	123	3.0	56	1.4	67	1.6	67	1.6	114	3.1	62	1.7	52	1.4	31,060	5.8	15,066	2.8
60 to 64	75	1.8	38	.9	37	.9	37	.9	87	2.4	48	1.3	39	1.1	11,830	2.2	6,080	1.1
65 to 69	81	1.9	42	1.0	39	.9	39	.9	67	1.8	37	1.0	30	.8	9,975	1.8	5,181	.9
70 to 74																		
75 to 79	48	1.2	25	.6	23	.6	23	.6	50	1.4	24	.7	26	.7	6,887	1.3	3,584	.6
Median age	150	3.6	70	1.7	80	1.9	80	1.9	122	3.4	26.07	1.4	72	2.0	8,765	1.6	4,443	.8
			25.97		25.37		25.37						26.12		19.2		19.4	

Age group (in years)	Total Navaho area Indian population, 1900 '3						Navaho area Indian population of Arizona and Utah, 1900 '3						Navaho area Indian population of New Mexico, 1900 '3					
	Both sexes			Males			Females			Both sexes			Males			Females		
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
All ages.....	91,861	100.0	45,236	49.2	46,625	50.8	56,410	100.0	27,887	49.4	28,523	50.6	35,451	100.0	17,349	48.9	18,102	51.1
Under 5.....	18,087	19.7	8,923	9.7	9,134	9.9	11,472	20.3	5,664	10.0	5,808	10.3	6,585	18.6	3,259	9.2	3,326	9.4
Under 1.....	4,213	4.6	2,096	2.3	2,117	2.3	2,676	4.7	1,330	2.4	1,346	2.4	1,537	4.3	766	2.2	771	2.2
1 to 4.....	13,844	15.1	6,837	7.4	7,017	7.6	8,796	15.6	4,334	7.7	4,462	7.9	5,048	14.2	2,493	7.0	2,555	7.2
5 to 9.....	15,058	16.4	7,303	8.0	7,755	8.4	9,111	16.2	4,416	7.8	4,695	8.3	5,947	16.8	2,887	8.1	3,060	8.6
10 to 14.....	11,839	12.9	6,093	6.6	5,786	6.3	6,993	12.4	3,751	6.6	3,242	5.7	4,846	13.7	2,302	6.5	2,544	7.2
15 to 19.....	9,307	10.1	4,634	5.0	4,673	5.1	5,748	10.2	2,839	5.0	2,909	5.2	3,559	10.0	1,795	5.1	1,764	5.0
20 to 24.....	7,138	7.8	3,382	3.7	3,756	4.1	4,342	7.7	2,034	3.6	2,308	4.1	2,766	7.9	1,348	3.8	1,448	4.1
25 to 29.....	5,782	6.3	2,661	2.9	3,121	3.4	3,653	6.5	1,709	3.0	1,944	3.4	2,129	6.0	952	2.7	1,177	3.3
30 to 34.....	4,938	5.4	2,264	2.5	2,674	2.9	3,008	5.3	1,372	2.4	1,636	2.9	1,930	5.4	892	2.5	1,038	2.9
35 to 39.....	4,387	4.8	2,050	2.2	2,337	2.5	2,575	4.6	1,135	2.0	1,440	2.6	1,812	5.1	915	2.6	897	2.5
40 to 44.....	3,181	3.5	1,650	1.8	1,531	1.7	1,986	3.5	1,058	1.9	928	1.6	1,195	3.4	502	1.7	603	1.7
45 to 49.....	3,097	3.4	1,542	1.7	1,555	1.7	1,751	3.1	854	1.5	897	1.6	1,346	3.8	688	1.9	658	1.9
50 to 54.....	1,983	2.2	983	1.1	1,000	1.1	1,199	2.1	585	1.0	614	1.1	784	2.2	398	1.1	386	1.1
55 to 59.....	2,192	2.4	1,134	1.2	1,058	1.2	1,320	2.4	708	1.3	622	1.1	862	2.4	426	1.2	436	1.2
60 to 64.....	1,339	1.5	771	.8	568	.6	852	1.5	511	.9	341	.6	487	1.4	260	.7	227	.6
65 to 69.....	1,398	1.5	701	.8	697	.8	941	1.7	437	.8	504	.9	457	1.3	264	.7	193	.5
70 to 74.....	824	.9	444	.5	380	.4	531	.9	307	.5	231	.4	293	.8	137	.4	156	.4
75+	1,341	1.5	741	.8	600	.7	918	1.6	507	.9	411	.7	433	1.2	189	.7	189	.5
Median age.....	15.5	-	15.4	-	15.7	-	15.5	-	13.2	-	15.9	-	15.5	-	15.6	-	15.3	-

See footnotes at end of table.

TABLE 31.—*Age distributions for selected Indian and Navaho Indian populations—1860-1961*¹—Continued

Age group (in years)	Navajo Reservation Indian population, 1960 ²⁴						Total Navaho population, December 7, 1961 ²⁵					
	Both sexes			Males			Females			Both sexes		
	Number	Percent		Number	Percent		Number	Percent		Number	Percent	
All ages.....	60,016	100.0		29,563	49.3		30,453	50.7		93,377	100.0	
Under 5.....	12,067	20.1		5,955	9.9		6,112	10.2		14,976	16.0	
Under 1.....	2,816	4.7		1,399	2.3		1,417	2.4		3,200	3.4	
1 to 4.....	9,251	15.4		4,556	7.6		4,695	7.8		11,776	12.6	
5 to 9.....	9,743	16.2		4,739	7.9		5,004	8.3		15,605	16.7	
10 to 14.....	7,629	12.5		3,806	6.3		3,723	6.2		12,401	13.3	
15 to 19.....	5,940	9.9		2,865	4.8		3,075	5.1		9,900	10.6	
20 to 24.....	4,516	7.5		2,116	3.5		2,400	4.0		8,900	9.5	
25 to 29.....	3,833	6.4		1,791	3.0		2,042	3.4		7,021	7.5	
30 to 34.....	3,242	5.4		1,533	2.6		1,709	2.8		5,315	5.7	
35 to 39.....	2,861	4.8		1,364	2.3		1,497	2.5		4,333	4.6	
40 to 44.....	2,203	3.7		1,108	1.8		1,095	1.8		3,360	3.6	
45 to 49.....	1,976	3.3		982	1.6		994	1.7		2,764	3.0	
50 to 54.....	1,482	2.5		793	1.3		687	1.1		2,431	2.6	
55 to 59.....	1,454	2.4		763	1.3		691	1.2		2,029	2.2	
60 to 64.....	923	1.5		511	.9		412	.7		1,420	1.5	
65 to 69.....	908	1.5		505	.8		403	.7		955	1.1	
70 to 74.....	496	.8		277	.5		219	.4		853	.9	
75 to 79.....	843	1.4		453	.8		390	.6		1,074	1.2	
Median age.....	15.6			15.5			15.6			16.8		

¹ Each age and sex-specific percentage in this table was rounded independently. Therefore, their sum does not always equal exactly 100.0 percent. Persons of unknown age, where specified, were excluded from all totals given in the table; therefore, the percentages shown pertain only to persons of known age. The number of persons excluded, when specified, is indicated in the footnote for the pertinent distribution.

² Bureau of the Census, 1864, table 1.

³ From data compiled by the late Clyde Kluckhohn and associates, supplied through the courtesy of Professors Kluckhohn and David F. Aberle. The figures reported in this table are synthetic totals obtained by summing the number of persons given in each age-sex group annually for series of 4-year periods. The period 1880-98 is the sum of the values for the years 1880-83, 1885-88, 1890-93, and 1895-98. Similarly, the values shown for the period 1900-1918 are the sum of the values for the

years 1900-1903, 1905-08, 1910-13, and 1915-18. Finally, the figures for the period 1920-48 are the sum of the values for the years 1920-23, 1925-28, 1930-33, 1935-38, 1940-43, and 1945-48.

The synthetic totals for the period 1880-98 exclude 189 males and 147 females of unknown age. Those for the period 1900-1918 exclude 117 males and 35 females of unknown age. It should be noted that far more males than females are of unknown age, particularly since 1900. This may reflect a correspondence of female informants, or it may be due to the greater ease with which ages of females could be verified in the Ramah community.

These inflated figures for the Ramah community are shown in this table in order to describe the "typical" Ramah age distributions during three periods, without giving fractions of persons in the upper age groups. The average population of the com-

¹³ From a sample of approximately 10 percent, selected by me from the original rolls on file in the Navajo Agency at Window Rock, Ariz. These data were labeled "1939 original," because they include only persons who were enrolled as of 1939, when the latest rolls were prepared. The totals exclude 41 males and 41 females of unknown age.

¹⁴ These data consist of the sample described in footnote 13 plus a similar sample of persons enrolled in the period 1939-57, whose reported ages indicate that they were alive in 1939. The data are therefore labeled as "1939 supplementary." The differences between the "1939 original" and the "1939 supplementary" figures are partial indication of the omissions that developed between 1923, when the original surveys were conducted, and 1939, when the latest copy of the roll was prepared.

¹⁵ From the files of the U. S. Public Health Service at Window Rock, Ariz., supplied through the courtesy of Dr. James Bonduant. This estimate was prepared by Francis Felsman, then statistician at the Navajo Agency. In preparing the estimate, the Navajo age distribution given in preliminary and unpublished returns of the 1940 census was utilized.

¹⁶ From unpublished tabulations prepared by the Bureau of the Census for the Bureau of Indian Affairs from preliminary results of the 1950 census. Final figures for the Navajo Reservation population came to 54,997. The discrepancy of 884 would be unlikely to have a significant effect upon the age distribution. Data supplied through the courtesy of Dr. Henry D. Sheldon, Bureau of the Census.

¹⁷ Bureau of the Census, 1953 a, table 3.

¹⁸ From special tabulations prepared by the Bureau of the Census for the Bureau of Indian Affairs from the returns of the 1950 census. These data also were supplied through the courtesy of Dr. Henry D. Sheldon and are shown, in part, in Bureau of the Census, 1953 a, table 16.

¹⁹ From a sample of approximately 10 percent taken by me from the original returns of the Fort Defiance subagency school census conducted in 1956-57. These census returns were made available through the courtesy of Mrs. Lilly Richards at Fort Defiance, with the permission of Dr. Don May at Window Rock, Ariz. The total population listed in this school census was 21,780. The figures shown exclude 49 males and 54 females of unknown age.

²⁰ From the files of the Albuquerque, N. Mex., Office of the Division of Indian Health, U. S. Public Health Service, supplied through the courtesy of Miss M. Blakeman. These estimates, together with similar estimates prepared annually since 1945, were originally prepared under the supervision of J. Nixon Hadley.

²¹ From a sample of approximately 10 percent selected by me from the rolls on file at the Navajo Agency at Window Rock, Ariz., including all persons enrolled up to the time that the sample was selected, during the summer of 1957, and deleting persons on the roll whose deaths were recorded on the rolls. The ages shown are as of July 1, 1957, and the totals exclude 32 males and 32 females of unknown age.

²² Bureau of the Census, 1963 c, table 2.

²³ Bureau of the Census, 1963 c, table 51. These data pertain to the Indian population enumerated in the following six counties: Arizona—Apache, Coconino, and Navajo; New Mexico—McKinley and San Juan; and Utah—San Juan. In addition to Navahos the Indian population of these counties includes Hopis, Zunis, and smaller numbers of Indians from other tribes.

²⁴ Prepared by Francis Felsman and Everett White of the Department of Health, Education, and Welfare, from unpublished tabulations of the non-White population by enumeration district, supplied by the Bureau of the Census. All non-Whites enumerated in enumeration districts within the Navajo Reservation boundaries are included in these figures.

Footnotes continued on following page.

munity for the periods 1880-98 and 1900-1918 would be about $\frac{1}{4}$ of the figures given in the table, while the average for the period 1920-48 would be about $\frac{1}{4}$ of the figures shown.

⁴ Hrdlička, 1908, p. 40. The figures shown are estimates derived from Hrdlička's reported total of 232,562 Indians in the mainland United States, and from his reported percentage age-sex distribution. Since these percentages were given to two decimal places, the derived figures are quite accurate. The total male population falls short of Hrdlička's figure by four, due to the effects of rounding. The total Indian population of the United States in 1900 (excluding Alaska) was given as 237,224 in Bureau of the Census, 1901, p. cxxiv. It is presumed that Hrdlička's total of 232,562 excludes Indians whose ages were not reported in that census.

⁵ Bureau of the Census, 1915, tables 30, 51, 69, 83, and 92. The figures shown exclude 41 males and 37 females of unknown age. The quinquennial age groups shown in this table are estimates prepared by me from reported totals for 6-9, 10-14, 15-19, 20-24, 25-34, 35-44, 45-50, 51-64, and 65 and over, by sex, and from reported numbers of Navaho literates in the age groups 10-14, 15-19, 20-29, 30-39, and 40 and over, also by sex. The number of literate Navahos aged 20 and over was distributed among the succeeding age groups in proportion to an estimate of the number who had received some formal schooling, by age (Johnston, *in press*). The resultant 10-year age groups were then divided into 5-year groups in proportion to those given for the total Indian population of the United States in 1910, as given in the above source, table 38.

⁶ Bureau of the Census, 1915, table 38. The figures shown exclude 481 males and 468 females of unknown age.

⁷ Paquette, MS. The ages given in Paquette's original report were for age groups 1-5, 6-10, 11-15, etc. They are here given as 0-4, 5-9, 10-14, etc. without adjustment. The number of infants by sex for this population was estimated by me on the basis of a single-year age distribution which I obtained from an approximate 10-percent sample of the original roll. This sample produced a total of 214 children under 5, of whom 31 were under 1 year of age. Applying the ratio of 31 to 213 to the reported number of 2,585 children under 5 produced an estimated number of 374 infants. The same procedure applied to the sample numbers of 13 male and 18 female infants produced 154 males and 220 females under 1 year of age. These values are admittedly implausible, but they at least reflect the findings of the sample that was obtained.

⁸ Loneragan, MS, a; Crane, MS. The figures shown in this table are inflated values obtained by summing the reported age-sex specific frequencies of 1915, 1916, and 1920. The average population of these two bands for the period 1915-20 would approximate one-third of the values shown. This procedure was adopted in order to avoid showing fractions of persons in the upper age groups while at the same time indicating the "typical" age distribution of these bands at this time. The totals given exclude 5 males and 3 females of unknown age.

⁹ Kurth, MS. The totals exclude 1 male and 1 female of unknown age, and were obtained from a 10-percent sample selected by me from the original rolls.

¹⁰ Bureau of the Census, 1937, table 16. The totals exclude 229 males and 220 females of unknown age.

¹¹ Bureau of the Census, 1937, table 21. The totals exclude 30 males and 8 females of unknown age.

¹² From the files of the late J. Nixon Hadley, U. S. Public Health Service (published in Hulsizer, 1940). The totals exclude 3,615 males and 3,464 females of unknown age. Thus, the total Navaho population enumerated in this survey amounted to 35,511, of whom 19.8 percent were of unknown age. There is also an apparently serious deficiency in the reported numbers of infants in this survey.

Footnotes to table 31 continued.

²⁵ This is not an official estimate of the Navaho Indian population. It was obtained from a run of IBM cards prepared by the Branch of Education of the Navajo Agency. The original data were collected by the school censuses conducted during the late 1950's. Although these data were checked and family numbers assigned by the subagency officials before transcription onto IBM cards, the resultant count is still regarded as deficient in certain respects. First, families with no minor children present would be more likely to be omitted in a school census whose major purpose is to enumerate children of school age. Second, the listings include some members of other tribes and a few non-Indians whose membership in an Indian family entitles them to Government services. Third, the listings were originally prepared by the several school districts, so that a certain amount of duplication was inevitable, given the high mobility of the population. Finally, these school census data have not yet been reconciled or coordinated systematically with the several other listings of Navajo population, notably the Navajo Tribal Roll. Although these IBM card counts have not been granted the authenticity of an official population estimate, the work of verifying the listings of the school censuses, eliminating duplications, separately identifying Navajos, and improving the coverage has progressed to the point where these counts furnish information of considerable administrative value. (From communications received from Robert W. Young, Tribal Relations Officer, Gallup Area Office, Bureau of Indian Affairs, and from William H. Kelly, Director, Bureau of Ethnic Research, University of Arizona.)

TABLE 32.—*Child-woman and infant-child ratios, for selected Indian population—1860-1960*¹

Population and date	Number of women 15-49 years	Number of children under 5 years	Child-woman ratio (per 1,000) ²	Number of infants (under 1 year)	Infant-child ratio (percent) ³
Arizona County Indians; 1860 census	1,016	834	821	112	13.4
Ramah Navaho; 1880-98	463	498	1,076	116	23.3
Total U.S. Indians; 1900 census	53,098	33,708	635	7,086	21.0
Ramah Navaho; 1900-1918	980	1,028	1,049	221	21.5
Navaho; 1910 census (adjusted)	4,903	3,916	799	(4)	-----
Total U.S. Indians; 1910 census	53,572	40,384	689	8,216	20.3
Fort Defiance Agency Navaho; 1915	2,620	2,585	987	374	14.5
Canonicito and Puertocito Navaho; 1915-20	295	123	417	15	12.2
San Juan Agency Navaho; 1916	147	144	980	9	6.2
Ramah Navaho; 1920-48	3,214	2,544	792	568	22.3
Total U.S. Indians; 1930 census	74,883	46,680	623	9,296	19.9
Navaho; 1930 census	8,831	6,578	745	1,116	17.0
1936-38	6,363	4,906	771	959	19.5
Enrolled Navaho; 1939 (original)	1,329	606	456	114	18.8
1939 (supplementary)	1,332	800	601	154	19.2
Estimated Navaho; 1945 (adjusted)	13,984	10,075	720	2,137	21.2
Reservation Navaho; 1950 census	12,129	9,236	761	(4)	-----
Total U.S. Indians; 1950 census	75,051	51,988	693	(4)	-----
Navajo Agency area (total); 1950 census	14,232	10,934	768	(4)	-----
(Arizona and Utah)	8,669	6,871	792	(4)	-----
(New Mexico)	5,563	4,063	730	(4)	-----
Fort Defiance subagency Navaho; 1956-57	502	388	773	63	8.2
Estimated Navaho; 1957	18,497	14,368	777	(4)	-----
Enrolled Navaho (total); 1957	2,078	512	246	15	2.9
(Arizona and Utah)	1,092	280	256	7	2.5
(New Mexico)	986	232	235	8	3.4
Total U.S. Indians; 1960 census	112,661	91,287	810	(4)	-----
Navajo Agency area (total); 1960 census	19,647	18,057	919	⁴ 4,213	⁵ 23.3
(Arizona and Utah)	12,062	11,472	951	⁵ 2,676	⁵ 23.3
(New Mexico)	7,585	6,585	868	⁵ 1,537	⁵ 23.3
Navajo Reservation; 1960	12,812	12,067	942	2,816	23.3

¹ The age distributions from which these ratios were derived are shown in table 31, p. 156. The source of each distribution is indicated in the footnotes to that table.

² The "child-woman ratio" is the number of children under 5 years of age per 1,000 women aged 15 to 49 years. This measure serves as a convenient index of the recent fertility experience of a population.

³ The "infant-child ratio" is the number of infants (children under 1 year) per 100 children under 5 years of age. This measure is introduced here as an indicator of the degree of underregistration of births. In a population experiencing substantial infant mortality, but with no appreciable underregistration of births, this ratio should be somewhat in excess of 20 percent, assuming accurate age reporting.

The number of infants given for the population of Navahos at the Fort Defiance Agency in 1915 is estimated by me on the basis of the single-year age distribution obtained from an approximate 10 percent sample of the original roll. This sample produced a total of 214 children under 5, of whom 31 were under 1 year of age. Applying the ratio of 31 to 214 to the reported number of 2,585 children under 5 produces the estimated number of infants as 374.

⁴ The number of infants was not reported for this population.

⁵ Estimated from the proportion of persons under 5 years of age who were reported to be under 1 year of age among Indians on the Navajo Reservation in 1960. These data actually pertain to all non-Whites of enumeration districts falling within the boundaries of the Navajo Reservation.

For the period 1920 to 1957, the majority of the Navaho child-woman ratios display a marked uniformity. The major exceptions consist in the ratios obtained from the enrolled populations in 1939 and 1957. The deficiencies in these rolls have already been commented upon in the first part of this chapter. The remaining ratios fall within a range from 720 to 792, with a simple (unweighted) average of 760. It is interesting to note, in this connection, that the corresponding average infant-child ratio, calculated for those populations reporting the number of children under 1, comes to only 17.64 percent during this period.⁷

The 1960 census returns are enlightening in this regard. The reported age-sex distribution for non-Whites residing within the boundaries of the Navajo Reservation yields a child-woman ratio of 942 (see table 32) and an infant-child ratio of 23.3 percent. Since there is little evidence of a recent upsurge of Navaho fertility, this very high child-woman ratio suggests either that women of child-bearing ages were seriously underenumerated in 1960, or young children were seriously underenumerated among other Navaho populations in the 1920-57 period. There is some plausibility in both arguments. The reported infant-child ratio in 1960 suggests that infants were not undercounted in 1960. If we accept this sensible ratio as given, it is possible to develop an "adjusted" child-woman ratio for the earlier Navaho populations. This adjustment raises the average child-woman ratio for these populations from 760 to 816.⁸

If we now apply the rough calculation outlined in footnote 6, page 155, to this adjusted ratio, we obtain a crude birth rate in the neighborhood of 41 per 1,000. As noted previously, this rate is not reported for any Navaho population until 1956 and 1957.

Much of the preceding analysis of Navaho vital rates has been focused upon certain indicators of the underregistration of Navaho births and deaths during selected years or periods. Obviously, this focus ignores the equally fundamental problem of determining accurate base population figures. In the case of the Navaho-Hopi population combined, the variation that can result in the crude birth rate, as obtained by dividing a given number of registered births by different base figures, is shown in table 33.

The lowest derived crude birth rate shown in this table is obtained by using the total population enrolled on both the Navaho and Hopi

⁷ The child-woman ratio for this latter group of Navaho populations also happens to average exactly 760.

⁸ This adjustment procedure is as follows: If 23.3 percent of all children under 5 are under 1 year of age, the number of children under 1 must amount to 30.4 percent of those aged 1 to 4. Given an average of 760 children under 5 per 1,000 women 15 to 49 years, and an infant-child ratio of 17.64, the number of children under 1 is 760 times 0.1764, or 134. This implies that there are 626 children aged 1 to 4 years (760 minus 134). Now, if we assume that the "true" infant-child ratio is 23.3 percent, the number of children under 1 should amount to 30.4 percent of the number aged 1 to 4, or 190. The adjusted child-woman ratio therefore comes to 626 plus 190, or 816.

rolls in 1950 as a base figure. One might justify the use of this high figure on the grounds that all births occurring among members of this enrolled population, and no other births, should theoretically be registered as Navaho or Hopi. The resultant rate, as shown in table 33, is 3.4 percent lower than the official rate for this year.

TABLE 33.—*Estimates of the crude birth rate, Navaho-Hopi agency areas—1950*

Population base	Total population	Number of registered births ¹	Crude birth rate ²	Percent difference in birth rates ³
Navaho-Hopi enrolled population; 1950 ⁴ -----	72,695	2,300	31.6	-3.4
Navaho-Hopi population (derived from the reported number and rate of births) ⁵ -----	70,229	2,300	32.7	.0
	70,444			
Navaho-Hopi service area population ⁴ -----	67,001	2,300	34.3	4.9
Navaho-Hopi agency area population; 1950 census ⁶ -----	65,666	2,300	35.0	7.0
Resident population of the Navaho-Hopi reservations ⁴ -----	59,008	2,300	39.0	19.3

¹ Bureau of Indian Affairs, 1954 a, p. 14. In this report, a total of 6,901 live births were reported for the Navaho-Hopi agencies for the 3 years, 1949, 1950, and 1951. This total produces an average of 2,300 annual live births at this time.

² The number of births during the year, divided by the average population in that year, times 1,000 gives the crude birth rate. The official rate is 32.7.

³ These differences were calculated by using the official crude birth rate of 32.7 as a base.

⁴ Bureau of Indian Affairs, 1954 c, p. 18.

⁵ The total is derived from the reported number of births and the birth rate, assuming that the latter falls between 32.65 and 32.75.

⁶ Bureau of the Census, 1953 a, p. 62.

The next rate shown in the table is the official rate for that year. The estimated population that is derived from this official rate and the number of births reported for that year imply that over 2,000 enrolled Navahos and Hopis are unaccounted for in the official rate.

The remaining three rates were calculated merely to illustrate the effects of progressively restricted assumptions in regard to the base population whose fertility is represented by the births reported for that year. If we assume, for example, that only births occurring among Navahos and Hopis residing in the service area surrounding the two reservations are likely to be properly registered as such, we derive a crude birth rate of 34.3, which is 4.9 percent higher than the official rate. Alternatively, using the total enumerated Navaho and Hopi population, comprising all Indians whose usual residence was within the Navaho and Hopi agency areas as of April 1, 1950, we obtain a crude birth rate of 35 per 1,000.⁹ Finally, if we were to assume that births occurring among Navahos or Hopis residing outside the confines of their respective reservations were not likely to be registered as such, we might use the resident population of the two reservations as a base figure. This produces a crude birth rate

⁹ For the limited purpose of this exposition, it was not deemed necessary to adjust the official census figures in order to provide an estimate of the midyear population. Such an adjustment would have the effect of reducing the derived crude birth rate from 35.0 to about 34.8 per 1,000.

of 39 per 1,000, which is about 19 percent higher than the official rate reported for this year.¹⁰

It should be stressed that the relative merits of the alternative populations which might be used as a base for calculating Navaho vital rates is not at issue. The point to be noted is that each of these populations represents a particular definition of the universe "at risk," and these alternative populations differ sufficiently in size to introduce significant variation in the derived rates.¹¹

A word should be added, finally, in regard to the range of chance variation that is associated with the vital rates that may be derived from a population, such as the Navaho, whose size is 60 or 70,000 persons. If, for example, we have a base population of 70,000 and a reported crude birth rate of 35 per 1,000, the range of probable error (at 95 percent confidence limits) is plus or minus 1.4 per 1,000. This means that there is a 95 percent probability that the "true" rate lies somewhere between 33.6 and 36.4 per 1,000 (see Appendix).

Similarly, if we have a base population of 7,000 and a reported crude death rate of 10 per 1,000, the range of probable error (or chance variation), again with 95 percent confidence limits, is plus or minus 0.8 per 1,000, so that we have a 95 percent probability that the "true" rate lies somewhere between 9.2 and 10.8 per 1,000.

This last consideration introduces a measure of irreducible indeterminacy among the vital rates and other similar measures that can be derived from populations whose size is as small or smaller than that of the Navaho. One major conclusion can be drawn from this fact: However accurate the basic data may be, all calculations derived from these data (involving proportions or rates of occurrence) and the inferences based thereon, should allow for the variation that is necessarily associated with the small frequencies involved.

Since 1944, annual summaries of Navaho deaths, by age and sex, have been compiled from copies of death certificates forwarded to the Navajo Agency at Window Rock, Ariz. The average number of reported deaths, by age and sex, for the periods 1944-46, 1948-52, and 1953-57, is shown in table 34. For each of these periods, the estimated Navaho population at midyear of the central year of the interval is also shown, permitting calculation of age-specific death rates for both sexes combined.

Unless one accepts the implausible view that the reporting of deaths among the Navaho has been progressively deficient in recent years, the

¹⁰ Here also, an upward adjustment of the base figure (which pertains to the population as of April 1, 1950) to provide an estimate of the population at midyear would reduce the derived crude birth rate from 39.0 to about 38.8 per 1,000.

¹¹ The corresponding variation in the crude death rates would be much less than that of the crude birth rates, because of the lower magnitude of the former rates. For example, applying the alternative base populations given in table 33 to an "official" crude death rate of 10.0 per 1,000 would produce rates from 9.6 to 11.9 per 1,000.

rates shown in table 34 point clearly to a rapid decline in overall mortality levels, particularly in the early years of life following infancy and in the early adult years. So long as the Navaho continue to maintain the high levels of fertility which they presently manifest, continuation of the present mortality declines may well produce an unprecedented rate of increase in this population in the future.

The age-specific death rates that are shown in table 35 serve to indicate both the apparent recent trends in Navaho mortality and the necessarily approximate nature of all such rates, owing to the small size of the population at risk, and the approximate nature of the basic population totals. Four sets of rates are shown in table 35. The first set is derived from the average of the age-specific deaths reported among the Navaho for the years 1944 through 1946. The corresponding population bases are obtained from an estimate of the population at midyear 1945. The second and third sets of rates are derived from the average of the age-specific deaths reported for the years 1948 through 1952. The base population used in deriving the second set of rates is the Navaho population as enumerated on April 1, 1950, taken without adjustment. The base population used in deriving the third set of rates is an estimate for midyear 1950, which corresponds closely to the official Bureau of Indian Affairs estimate of the Navaho population at this time. These two sets of rates, utilizing the same numbers of reported deaths, are presented as a further illustration of the variation which can be expected in connection with prevalent uncertainties regarding the size of the base population. The fourth set of rates is derived from the average number of age-specific deaths reported during the years 1953 through 1957, using an estimate of the Navaho population at midyear 1955 as a base.

The range of "chance variation" (using 95 percent confidence limits) was also calculated for each of the rates shown, in order to indicate the amount of variation that is associated with the small size of the populations at risk.¹²

The major trend to be noted in the mortality of the Navaho between 1945 and 1950 appears to be a marked decline, for each sex, in the broad age group from 5 to 44. The death rates of this same group display an accelerated decline between 1950 and 1955. Taking into consideration the range of chance variation that is associated with these particular rates, the decline between 1945 and 1955 is evidently significant.¹³

¹² The broad age groupings used in presenting these data were selected to minimize the variation associated with the small size of the populations at risk, while at the same time giving some indication of the trends in the reported death rates during this period, for different age-sex groups.

¹³ The lowest "probable" death rate for Navaho males 5 to 44 in 1945, as shown in table 35, is 4.3 per 1,000. The highest "probable" death rate for the corresponding group in 1955 is 3 per 1,000. This decline is even more marked among Navaho females in this age group, from a probable low of 4.8 per 1,000 in 1945 to a probable upper limit of only 1.9 per 1,000 in 1955.

TABLE 34.—Average number of reported deaths among the Navaho—1945, 1950, and 1955

Age group (in years)	1945				1950				1955			
	Estimated total population July 1 ¹	Number of reported deaths ² 1944-46 average		Death rate per 1,000 ³	Estimated total population July 1 ⁴	Number of reported deaths ⁵ 1948-52 average		Death rate per 1,000 ³	Estimated total population July 1 ⁶	Number of reported deaths ⁷ 1953-57 average		Death rate per 1,000 ³
		Both sexes	Male			Both sexes	Male			Both sexes	Male	
All ages-----	61,062	658	342	10.8	69,374	688	372	9.9	77,200	587	330	7.6
Under 5-----	10,075	341	180	33.8	11,804	382	205	32.4	13,135	325	170	24.7
Under 1-----	2,137	234	124	109.5	2,506	274	153	109.3	2,788	257	137	92.2
1 to 4-----	7,938	107	56	13.5	9,298	108	52	11.6	10,347	68	33	6.6
5 to 9-----	8,916	30	17	3.4	10,971	23	12	2.1	12,208	15	8	1.2
10 to 14-----	8,182	25	15	3.0	9,355	16	7	1.7	10,409	6	4	0.6
15 to 19-----	7,633	31	14	4.1	7,578	22	11	2.9	8,433	13	9	1.5
20 to 24-----	4,091	44	20	10.8	6,121	38	20	6.2	6,812	17	11	2.5
25 to 29-----	4,680	31	13	6.8	4,680	33	17	7.2	5,097	19	11	3.7
30 to 34-----	3,725	23	10	6.2	3,588	22	12	6.1	3,993	16	10	4.0
35 to 39-----	3,176	20	9	6.3	3,254	20	10	6.1	3,622	12	8	3.3
40 to 44-----	2,564	16	7	6.2	2,644	15	9	5.7	2,942	10	9	6.4
45 to 49-----	2,076	15	6	7.2	2,367	13	7	5.5	2,634	12	7	4.6
50 to 54-----	1,649	14	8	8.5	1,777	14	10	7.9	1,978	12	8	6.1
55 to 59-----	1,222	7	5	5.7	1,388	11	6	7.9	1,544	12	7	7.8
60 to 64-----	977	12	5	12.3	1,109	13	7	11.7	1,235	18	12	14.6
65 to 69-----	793	12	8	15.1	1,034	15	9	14.5	1,151	13	8	11.3
70 to 74-----	732	12	8	16.4	1,687	13	7	18.9	1,764	17	10	22.2
75 and over-----	671	25	17	37.2	1,117	38	23	34.0	1,243	61	37	49.1

¹ Prepared by Francis Felsman on the basis of preliminary returns of the 1940 census and an estimated total for midyear, 1945, of 61,062. Obtained from a letter from Mr. Felsman to Dr. Fred T. Ford, dated Feb. 8, 1949, through the courtesy of Dr. Bondurant, Window Rock, Ariz.

² Bureau of Indian Affairs, 1950, pp. 9, 18, 27. The average number of deaths for this period, by age and sex, is the sum of the deaths reported for each age-sex group for 1944-46, divided by three. The totals shown are the sum of the averages for each age-sex group.

³ Obtained by dividing the average number of deaths reported for the given age group, both sexes combined, by the estimated population of that age group, and multiplying the result by 1,000.

⁴ Derived from the reported crude death rate for the year 1950, as given in Young, 1955, 154. This total was then distributed in proportion to the age distribution of the 1950 census, as given in table 31.

⁵ Compiled by Dr. Robert L. Smith and published, in abbreviated form, in Smith et al., 1956. The figures given in this table are the sum of the deaths reported, by age-group, for the years 1948-52, divided by five.

⁶ The estimated total shown for July 1, 1955, is a simple average of the figures obtained from the reported number of births and the crude birth rate, and from the reported number of deaths and the crude death rate for the year 1955, rounded to the nearest hundred. A more exact estimate was not feasible as the crude death rates were

reported only to one decimal place. The basic data are given in Young, 1958, p. 339. This estimated total was distributed in proportion to the age distribution of 1957 as given in table 31. The numbers aged under 1 and 1-4 were estimated from the proportions given in the 1945 estimate of the Navaho population, also given in table 31.

⁷ The number of deaths reported among the Navaho for 1953 and 1954 were taken from the files of the U. S. Public Health Service, Window Rock, Ariz., office, through the courtesy of Dr. Bondurant. The number of deaths occurring among persons 65 years and over, as recorded in these files, was distributed among the age groups 65-69, 70-74, and 75 and over in proportion to the deaths reported in the corresponding age groups in 1952.

The number of deaths in 1955, 1956, and 1957 are from Young, 1958. The percentage distribution of the deaths in 1957 is from Young, 1958, p. 341. That for 1955 is from Young, 1957, p. 295.

The percentage distribution for 1956 was not found by me. The total number of deaths reported for 1956 was therefore distributed according to the average of the distributions reported for 1955 and 1957.

Finally, the distributions of deaths for 1955 and 1957 were given in 10-year groups. These were divided into 5-year groupings in proportion to the 5-year distribution reported for deaths in 1954. The numbers of deaths shown in this table are the sum of the reported estimated deaths, by age and sex, for the years 1953-57, divided by five.

TABLE 35.—*Estimated death rates for selected Navaho age groups—1945, 1950, and 1955¹*

Age group (in years) and sex	1945				1950				1950				1955			
	Esti- mated popu- lation July 1	Number of re- ported deaths average	Death rate per 1,000 ²	Range of chance variation ($\pm 2\sigma$) ³	Enu- merated popu- lation April 1	Number of re- ported deaths average	Death rate per 1,000 ²	Range of chance variation ($\pm 2\sigma$) ³	Esti- mated popu- lation July 1	Number of re- ported deaths average	Death rate per 1,000 ²	Range of chance variation ($\pm 2\sigma$) ³	Esti- mated popu- lation July 1	Number of re- ported deaths average	Death rate per 1,000 ²	Range of chance variation ($\pm 2\sigma$) ³
Both sexes:																
All ages.....	61,062	658	10.8	10.3-11.3	64,274	688	10.7	10.3-11.1	69,374	688	9.9	9.5-10.3	77,200	587	7.6	7.3-7.9
Under 5.....	10,075	341	33.8	31.7-35.9	10,934	382	34.9	33.3-36.5	11,804	382	32.4	30.9-33.9	13,135	325	24.7	23.5-25.9
5 to 24.....	28,822	130	4.5	4.1-4.9	31,519	99	3.1	2.8-3.4	34,025	99	2.9	2.6-3.2	37,862	51	1.3	1.2-1.4
25 to 44.....	14,045	90	6.4	5.6-7.4	13,028	90	6.9	6.2-7.6	14,066	90	6.4	5.8-7.0	15,654	66	4.2	3.7-4.7
45 and over.....	8,120	97	11.9	10.5-13.3	8,793	117	13.3	12.2-14.4	9,479	117	12.3	11.3-13.3	10,549	145	13.7	12.7-14.7
Males:																
All ages.....	30,897	342	11.1	10.4-11.8	32,444	372	11.5	11.0-12.0	35,020	372	10.6	10.1-11.1	38,970	330	8.5	8.1-8.9
5 to 44.....	21,372	105	4.9	4.3-5.5	22,094	98	4.4	4.0-4.8	23,853	98	4.1	3.7-4.5	26,544	71	2.7	2.4-3.0
Females:																
All ages.....	30,165	316	10.5	9.8-11.2	31,830	316	9.9	9.4-10.4	34,354	316	9.2	8.7-9.7	38,230	257	6.7	6.3-7.1
5 to 44.....	21,495	115	5.4	4.8-6.0	22,453	91	4.0	3.6-4.4	24,238	91	3.8	3.4-4.2	26,972	46	1.7	1.5-1.9

¹ The figures shown in this table (population and number of reported deaths) are derived from the more detailed data presented in tables 31 and 34. The sources of these data are indicated in the footnotes to those tables. The detailed data (in 5-year groups) were consolidated into the broader age groups shown in the above table in order to reduce the effects of chance variation associated with small population frequencies.

² This rate is the average annual number of deaths reported within the specified age-sex group, divided by the average population in that group for the specified period, times 1,000.

³ The lower limit of this range is obtained by subtracting the value 2σ from the specified death rate. The upper limit is obtained by adding the same value to the specified death rate. The value of σ is obtained by the conventional formula for determining the standard (probable) error of a proportion (see Appendix).

The death rates of Navaho children under 5 also suggest that a significant decline has occurred, at least in the period 1950 to 1955. The lower of the two death rates calculated for this age group in 1950 is 32.4 per 1,000. The range of chance variation associated with this rate gives a lower limit (at 95 percent confidence limits) of 30.9 per 1,000. The upper limit of the corresponding range in 1955 is 25.9 per 1,000, thus indicating a real decline.

The mortality of the Navaho population aged 45 and over, as expressed in the death rates shown in table 35, displays a reversal of this general downward trend, rising from 11.9 per 1,000 in 1945 to 13.7 per 1,000 in 1955. However, the overlap in the ranges of chance variation that are associated with these two rates indicates that the significance of the observed trend is highly questionable.¹⁴

In summary, it can be concluded that Navaho mortality, as reflected in the death rates shown in table 35, has declined in the period from 1945 to 1955. This decline is especially noteworthy since 1950, and is stronger in the female segment of the population than in the male. Comparing the lower limits of the ranges of chance variation in 1945 with the corresponding upper limits in 1955 suggests that the apparent declines are significant. It must be emphasized, however, that the continuing possibility that Navaho deaths are underreported, together with the persistent uncertainty with regard to the size of the base population, combine to throw considerable doubt upon these conclusions.

In concluding this analysis of the reliability of the available data on Navaho vital phenomena, a brief summary of certain measures of the underregistration of births occurring in the Navaho area is in order. In connection with the decennial censuses of 1940 and 1950, nationwide surveys were conducted in order to ascertain the completeness of birth registration. The procedure in both tests was essentially the same. In 1950, the census enumerators recorded the names of all infants born during the 3 months preceding the census date on a special "infant card." These names were then matched with birth certificates on file with the respective State registrars of vital statistics. The 1940 test differed from the 1950 survey in that it covered births occurring during a 4-month period prior to the census date, and included infants born during this interval but dying prior to the census date (Hadley, 1952 a).

Since all pertinent records included information on the race and birthplace of the infant, separate statistics for Indian births in the area of the Navajo Reservation could be compiled. The basic measure used to summarize the results of these tests is the "percentage of

¹⁴ One might speculate, in this connection, that the apparent rise in the mortality of Navahos aged 45 and over is merely a reflection of improved reporting of deaths occurring among older Navahos, without a concomitant improvement in the corresponding base population figures.

matched births." This refers to the percentage of infants under 3 months of age (in 1950) enumerated by the census takers whose infant cards were successfully matched with birth certificates on file at the appropriate State registrar's office.¹⁵

The results of these tests can be summarized briefly. In 1940, approximately 40 percent of all births recorded by the census enumerators as occurring among the Indian populations of Arizona and New Mexico during the 4 months prior to the census date were matched with birth certificates on file at the respective State registrar's offices. In 1950, the corresponding percentage of matched births rose to about 60 (Hadley, 1952 a, table 1).

A closer analysis of the results of the 1940 test, focusing upon the six counties in Arizona and New Mexico whose non-White population was predominantly Navaho, indicated that only about one-third of known births occurring among the non-White population of this area (as recorded by the census enumerators) could be matched with birth certificates at this time. In 1947, a further effort was made to match Navaho births and deaths that were known to agency officials against birth and death certificates on file at that time. This test indicated that 43.7 percent of known births, and 77.9 percent of known deaths, were supported by appropriate certificates in 1947 (Hadley, 1951, p. 5).

The results of these several tests are admittedly inconclusive. In his discussion of the findings of the 1947 study, Hadley made pointed reference to the difficulties in matching that are associated with the peculiarities of Navaho nomenclature. He states that some of the birth certificates that were duly filed could not be matched solely because the name of the child recorded thereon differed from the name as reported to agency officials. Although the registration of deaths was evidently far superior to the registration of births at this time, the Navaho predilection for plural names undoubtedly impaired the effectiveness of the attempt to match known deaths against death certificates as well.¹⁶

¹⁵ It should be noted that the results of such a test cannot be entirely conclusive, especially in areas experiencing severe underregistration of births, since the probability that a birth will not be registered is related to the probability that the same infant will not be enumerated.

¹⁶ The results of the 1940 matching test, as they pertain to American Indians throughout the United States, are summarized in Hadley, 1950.

The inconclusiveness of these tests, as applied to the Navaho, can be illustrated by adjusting the birth and death rates derived from the reported Navaho births and deaths in 1947 according to the percentages of birth and death certificates that were matched. Such an adjustment would increase the crude birth rate from 22.5 to 51.4 per 1,000, and the crude death rate from 11.1 to 14.2 per 1,000, giving a crude rate of natural increase of 3.72 percent per year at this time.

It should be noted, in this connection, that the underregistration (or delayed registration) of births may produce a disproportionate reduction in the derived death rate. This effect is produced because the majority of infant deaths occur soon after birth. Hence

Granting the severe limitations of these matching studies, it is nevertheless evident that their results lend further support to the conclusion that the reporting of vital events among the Navaho is extremely unreliable, at least until the very recent past.

MODEL AGE DISTRIBUTIONS

The 10 model age distributions, shown in table 36, were developed for purposes of comparison with the Navaho age distributions whose summary characteristics are given in table 28. Each model is derived from two basic parameters; an assumed life expectancy at birth (for both sexes combined) and an assumed rate of natural increase.

In selecting the values to be assigned to these parameters, an effort was made to approximate conditions which might have obtained among the Navaho population at different periods in the past. For example, Model *A*, derived from an assumed life expectancy of 30 years and a rate of natural increase of 1.8 percent per year, was intended to approximate conditions which might have existed during the latter part of the 19th century. Similarly, Models *B* and *C* reflect the age distribution of a population whose mortality level is still relatively high, having a life expectancy of only 35 years. In Model *B*, the accompanying growth rate is assumed to be 2.0 percent per year, while in Model *C*, the assumed growth rate lies at 2.25 percent per year.

The remaining models are designed to approximate the effects of progressive declines in the general level of mortality, in combination with a constant or slightly declining level of fertility. In order to facilitate comparisons between the model age distributions and those of the Navaho population, the median age for each sex, the child-woman ratio, and the implied crude birth rate derived from each model are also given in table 36.

Comparing the median ages of the 10 models with those given in table 28, we find that most of the Navaho medians fall below the model medians. This is especially striking in view of the fact that except for Model *J*, the lowest model medians (obtained from Models *A* and *C*) purport to reflect the combined effects of very high levels of fertility and mortality. The crude birth and death rates that are implied in Model *A* are 52.2 and 34.2 per 1,000, respectively. The corresponding rates implied in Model *C* are 50.8 and 28.3 per 1,000, respectively. If we assume that either of these models represents plausible upper limits for the fertility and mortality levels experienced

prolonged delay in registering a birth means that, in some instances, both the birth and the death will go unrecorded simply because the infant died before his birth was recorded.

In areas experiencing substantial infant mortality, this kind of delayed registration could result in a reduction of the death rate, as derived from reported deaths, by as much as 10 or 15 percent, while it would reduce the derived birth rate by no more than 3 or 4 percent. See, in this connection, Winnie, 1959, ch. 13, p. 8.

TABLE 36.—*Hypothetical age distributions, in percent by sex, derived from selected model life table L_x values*¹

Age groups	Model A $e_0^{BS}=30$ years $r=1.80$ percent		Model B $e_0^{BS}=35$ years $r=2.00$ percent		Model C $e_0^{BS}=35$ years $r=2.25$ percent		Model D $e_0^{BS}=42.5$ years $r=2.25$ percent		Model E $e_0^{BS}=50$ years $r=2.50$ percent		Model F $e_0^{BS}=57.6$ years $r=2.50$ percent		Model G $e_0^{BS}=57.6$ years $r=2.75$ percent		Model H $e_0^{BS}=60.4$ years $r=3.00$ percent		Model I $e_0^{BS}=57.6$ years $r=3.00$ percent		Model J $e_0^{BS}=60.4$ years $r=4.00$ percent	
	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males	Males	Fe- males
All ages.....	49.5	50.5	49.4	50.6	49.4	50.6	49.3	50.7	49.2	50.8	49.2	50.8	49.3	50.7	49.2	50.8	49.2	50.4	49.4	50.6
Under 5.....	8.8	9.0	8.5	8.7	8.9	9.2	8.7	8.4	8.1	8.2	7.6	7.8	8.1	8.2	8.4	8.5	8.5	8.7	10.1	10.3
5 to 9.....	6.9	7.1	6.8	7.0	7.1	7.2	6.9	6.9	6.7	6.9	6.5	6.6	6.8	6.9	7.0	7.1	7.1	7.2	8.1	8.2
10 to 14.....	6.0	6.2	6.0	6.1	6.1	6.2	5.9	6.0	5.8	6.0	5.7	5.8	5.8	6.0	6.0	6.1	6.0	6.1	6.5	6.6
15 to 19.....	5.3	5.4	5.2	5.3	5.3	5.4	5.1	5.2	5.1	5.2	5.0	5.1	5.1	5.0	5.1	5.2	5.1	5.2	5.3	5.4
20 to 24.....	4.6	4.6	4.5	4.6	4.6	4.6	4.4	4.5	4.4	4.4	4.3	4.4	4.3	4.4	4.3	4.4	4.3	4.4	4.3	4.4
25 to 29.....	3.9	3.9	3.8	3.9	3.8	3.8	3.6	3.7	3.6	3.6	3.5	3.6	3.5	3.6	3.6	3.7	3.6	3.7	3.4	3.5
30 to 34.....	3.3	3.3	3.3	3.3	3.2	3.2	3.1	3.2	3.1	3.1	3.0	3.1	3.1	3.1	3.1	3.2	3.1	3.2	2.8	2.8
35 to 39.....	2.7	2.7	2.7	2.7	2.6	2.6	2.5	2.6	2.5	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.5	2.6	2.2	2.3
40 to 44.....	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	1.8	1.8
45 to 49.....	1.8	1.8	1.8	1.9	1.7	1.8	1.9	1.9	1.9	1.9	1.7	1.8	1.9	1.9	1.8	1.9	1.8	1.9	1.4	1.4
50 to 54.....	1.4	1.4	1.5	1.5	1.4	1.4	1.5	1.6	1.6	1.6	1.4	1.5	1.6	1.6	1.5	1.6	1.4	1.5	1.1	1.1
55 to 59.....	1.0	1.1	1.1	1.2	1.0	1.1	1.2	1.3	1.2	1.3	1.1	1.2	1.3	1.3	1.2	1.3	1.2	1.3	.8	.9
60 to 64.....	.7	.8	.8	.9	.7	.8	.9	1.0	1.1	1.1	1.1	1.2	1.0	1.1	.9	1.0	.9	1.0	.6	.7
65 to 69.....	.4	.5	.5	.6	.5	.6	.6	.7	.7	.8	.8	.9	.7	.8	.6	.8	.6	.7	.5	.5
70 to 74.....	.2	.3	.3	.4	.3	.4	.5	.5	.5	.5	.5	.6	.4	.5	.4	.5	.4	.5	.3	.3
75+.....	.2	.2	.2	.3	.2	.3	.3	.4	.4	.5	.5	.7	.5	.6	.4	.6	.3	.5	.3	.3
Median age ²	17.86	17.81	18.27	18.31	17.46	17.48	18.74	18.89	18.89	19.16	19.78	20.15	18.85	19.16	18.19	18.50	17.96	18.24	14.95	15.14
Child-woman ratio ³	747		720		770		694		686		646		691		726		739		945	
Crude birth rate ⁴	52.2		48.0		50.8		43.6		40.9		36.7		39.0		39.9		41.3		49.4	

¹ The percentage age distributions shown above are derived from the L_x values of a selected number of model life tables, in combination with different assumed rates of natural increase. These model life tables were developed by the staff of the population branch of the United Nations for use in situations where age-specific data on the population and/or the number of deaths occurring are insufficient to permit the development of a conventional life table (United Nations, 1955 b; 1956, table 4).

The 10 age distributions (Models A-J) were derived from 6 different model life tables. The selected life tables are identified by the life expectancy at birth for both sexes combined (e_0^{BS}). Each of the model age distributions is developed from the L_x values derived from the specified model life table, in combination with the assumed rate of natural increase (r). The value of e_0^{BS} and r used to obtain each of the model age distributions is specified in the boxhead of the table. In calculating the age distributions, the given L_x values obtained from the specified stationary (model life table) population were adjusted in order to incorporate the effects of the assumed rates of natural increase. The resultant age distributions therefore represent stable, rather than stationary, populations. The adjustment procedure is outlined in the Appendix.

² The median ages are given for purposes of comparison with those shown in table 28, as derived from reported Navaho age distributions.

³ The child-woman ratio is the number of children under 5 per 1,000 women 15-49 years of age. This measure is shown for purposes of comparison with those shown in table 32 as derived from Navaho age distributions.

⁴ The procedure for calculating the crude birth rate from the adjusted model life table L_x values is detailed in the Appendix. The crude death rate that is implied in each of the model age distributions is equal to the crude birth rate minus 10 r .

by the Navaho, it then follows that the lower medians obtained from reported Navaho age distributions reflect a fairly persistent undercount (or underregistration) of the adult Navaho population.¹⁷

The discrepancy between the summary characteristics of Models *E* through *I* (whose parameters attempt to approximate more recent fertility and mortality conditions among the Navaho) and those of the Navaho age distributions since 1930 is even more marked. The majority of the Navaho medians in this period, excepting those derived from the 1939 and 1957 rolls, fall between 16 and 17 years, while those of Models *E* through *I* fall between 18 and 20 years. Here also, it might be concluded that the reported Navaho age distributions reflect an undercount of adult Navahos. Such an interpretation would also serve to explain why most of the Navaho child-woman ratios (given in table 32) are considerably higher than those derived from most of the later models, despite the fact that the respective crude birth rates are generally similar.¹⁸

Model *J* merits special comment in view of the extremely high rate of natural increase (4 percent per year) which it reflects. The implied crude birth rate (49) for this model is very nearly identical with the rate reported for a closely observed area of the Navajo Reservation in the 1955-59 period (see footnote 3, p. 152 f.). Furthermore, both the median ages and the child-woman ratios derived from this model are remarkably close to those reported for the Navaho area and the Navajo Reservation populations in the 1960 census. It would appear that Model *J*, which was originally selected to illustrate the maximum conceivable rate of natural growth, is a good representation of the current Navaho area population. If so, this area will continue to experience a very rapid population growth in the future.

It should be stressed, however, that such similarities may be fortuitous. The 10 models shown in table 36 are merely representative of a large number of alternative models which might be constructed on the basis of slightly different values and combinations of values assigned to the basic parameters. These models are valuable heuristically, insofar as they provide indicators of the values which might be typically expected under given conditions of fertility and mortality. However, the use of values derived from these models to "predict" or "adjust" the data obtained from the Navaho or other populations does not appear to be warranted.

¹⁷ It must be recognized, of course, that heavy mortality immediately before and during the Fort Sumner period, followed by a rapid recovery, would produce a "younger" population. Furthermore, the mortality levels typified in the models may not apply in the Navaho situation.

¹⁸ The reader will recall that the average child-woman ratio among the more representative Navaho age distributions for the 1920-57 period was 760. The corresponding average for Models *E* through *H* is only 687. The average crude birth rate implied in these same models, however, is 39.1 per 1,000, which is very close to the rate reported among the Navaho in 1956 and 1957.

Two arguments can be adduced in support of this contention. In the first place, the basic mortality rates from which the several United Nations model life tables were developed are heavily weighted by the age-specific mortality levels reported among European countries since 1920. One can certainly question the degree to which these largely European rates would pertain to the members of a population such as the Navaho, whose entire mode and condition of life are so different.¹⁹

Secondly, the selection of the most appropriate model or group of models to represent a specific population at a particular time in its development is confronted with great difficulties, when we lack reliable information on precisely those values which are needed in guiding our selection. The 80 life table models which were originally developed by the United Nations staff purport to cover, in their wide range of mortality levels, the known or expected conditions to be found among human populations anywhere. However, the selection of the single most appropriate model for a specific population is contingent upon a fairly precise knowledge of the infant or early childhood mortality experienced by that population. Unfortunately, in most situations where resort to such models would be helpful, the level of infant or child mortality is not precisely ascertainable. Conversely, where the level of infant mortality is known with a fair degree of accuracy, related information concerning mortality at other ages is likely to be sufficiently reliable as to make it unnecessary to resort to the models.²⁰

CONCLUSION

The major purpose of this study was to describe and analyze data on selected demographic characteristics of the Navaho population, in order to indicate the nature and limitations of the two major sources of these data; the Bureau of Indian Affairs and the Bureau of the Census. The main conclusion which has been reached on the basis of this investigation is that most of the data provided by these sources, at least until the recent past, are of insufficient quality to support precise inferences with respect to the basic demographic characteristics of the Navaho population. This conclusion is supported by the many vagaries and inconsistencies contained in these data, as revealed in the foregoing analysis. However, the results of this investigation do not appear to be entirely negative. On the basis of the available data,

¹⁹ For example, the apparent "undercount" of adult Navahos, as reflected in the low median ages for most of the Navaho age distributions, may in fact be an accurate indication of higher levels of mortality among young adult Navahos of both sexes. Their largely European counterparts, whose mortality levels are expressed in the model life table values, may simply have experienced lower mortality (see Carrier, 1958, p. 155).

²⁰ For a general criticism of the United Nations model life table scheme, together with a brief exposition of an alternative method, consult Gabriel and Ronen, 1958.

it is possible to trace at least the broad outlines of Navaho population growth during the past century. Furthermore, this study has provided a limited but suggestive demonstration of the usefulness of certain analytical devices by means of which the demographer can evaluate the available data and then utilize these data in the development of typological constructs which reflect the probable characteristics of the population in question.

As was discussed in the introductory chapter, an important difficulty which attends any attempt to develop precise measures of demographic phenomena among the Navaho or indeed, among American Indians in general, is the problem of definition. A legal definition of the category "American Indian" is essentially a composite of the widely differentiated criteria of tribal membership or affiliation which are enforced by the several Indian tribes who retain the right to establish or modify these criteria. In the case of the Navaho tribe no official criterion has yet been established, although the requirement that applicants for enrollment on the census office rolls at Window Rock, Ariz., should be able to establish that they are at least "one-fourth" Indian has been in practice for some time.

Meanwhile, the Bureau of the Census, confronted with the requirement that American Indians should be enumerated as a distinct racial or ethnic group in its decennial censuses, has perforce utilized its own definition of "American Indian," which is best reflected in the actual field procedures whereby persons are classified as American Indians in the course of the enumeration. By this "operational" definition, a person was classified as an American Indian if he was identified as such by the enumerator or, in 1960, if he identified himself as an Indian. In cases of doubt, the enumerator could resort to the "prevailing judgment of the local community" (which means, in most instances, his own personal judgment) or he could ask the respondent his racial affiliation. Although the observed disparity between the size of the Indian population as enumerated by the Bureau and the size of the Indian population as estimated from tribal rolls cannot be attributed solely to these definitional differences, such differences undoubtedly contribute to this disparity.²¹

Admittedly, this problem of definition has been of small import among the Navaho population in the past, because of the relative isolation and easy identifiability of most of its members, and the

²¹ As mentioned on p. 13, the introduction of self-enumeration in the 1960 census has brought about a major change in the census definition of Indians or members of other ethnic groups by reversing, in effect, the order of priority between the judgment of the enumerator and that of the respondent. Insofar as respondents received and filled out the advance census forms prior to the enumerator's visit, they were able to classify themselves as to race. In theory, this innovation would provide a census count of Indians which could serve as a useful check on the totals derived from the several tribal rolls. However, such a check is hardly practicable in view of the failure to record tribal affiliation of the Indians enumerated in the 1960 census.

well established contiguous area of Navaho settlement. However, this problem promises to grow rapidly in importance in the near future, with increasing numbers of Navahos leaving the reservation either temporarily or permanently, and additional numbers of previously unregistered persons seeking membership in the tribe.²²

In summary, it must be concluded that a plurality of Indian population totals, each reflecting a particular definition of this population, seems inevitable in view of the prevailing complexity of biological, legal, and cultural criteria whereby membership in an Indian population is determined at the present time.

While the development of reliable demographic measures of the Navaho population is dependent upon the existence of accurate and appropriate base figures, there remains the further difficulty of developing improved procedures for recording vital events among this population. Two important trends appear to offer some promise of rapid improvements in this connection. The first of these is the rapid development of hospital and related health facilities among the Navaho in recent years, accompanied by mitigation of the traditional Navaho reluctance to utilize this kind of medical service. With greater availability and use of such facilities, there is a greater likelihood that a Navaho birth or death will occur in a hospital, or be attended by a responsible representative of its medical staff. This naturally results in improved reporting of vital events.²³

Secondly, the equally impressive improvements that have been achieved in the general educational level of the Navaho population in the recent past can be expected to promote general improvements in the reliability and accuracy of the information obtained from this population.²⁴ It should be recognized, of course, that insofar as this educational process increases the attractiveness of nonreservation modes of life and the opportunities for gaining a livelihood in urban centers, it may also greatly complicate the problem of maintaining adequate administrative records of this population. The assimilation of Navahos into the mainstream of American life, furthermore, may

²² As is evident in the preceding analysis, any demographer who attempts to work with Navaho population data is immediately confronted with an assemblage of totals, such as the total "enrolled" population, the total "enumerated" population, the total "resident on the reservation," and the like. The selection of appropriate base figures in such a situation is not always easy.

²³ In 1950, less than 40 percent of Navaho births were estimated to have occurred in hospitals. This percentage is closely correlated with the percentage of known births that can be matched with registration certificates (Hadley, 1952 a).

²⁴ In the 1960 census, for example, I observed that many of the enumerators in the several areas of the reservation I visited were young, high-school educated, English-speaking Navahos who seemed to be well suited to bridging the enormous gap between the official census instructions and the realities of enumeration in this area.

loosen the ties between the off-reservation Navahos and their reservation origins.²⁵

With respect to the development of improved statistics on the population trends and characteristics of the Navaho and similar populations, the preceding analysis suggests two possible approaches. The first and only immediately practicable approach is to make the fullest possible use of the rapidly growing armamentarium of measures and constructs that are available to the demographer in the analysis of limited data. The second and longer range approach is to develop and maintain an improved system of population registration among the several populations in question.

The preceding analysis has provided but a small indication of the potential usefulness of the first approach in the evaluation and interpretation of inadequate or faulty demographic statistics. The several analytic tools that were utilized in this study serve two major functions; descriptive and heuristic. Such measures as the age and sex ratio scores, the joint scores, median ages, crude vital rates, and child-woman or infant-child ratios serve primarily to describe the magnitudes of the underlying population dynamics and apparent defects in the reporting of the vital events reflecting these dynamics. On the other hand, constructs such as the hypothetical age distributions developed in the preceding chapter serve a heuristic, rather than a descriptive, purpose. These "models" indicate the characteristics which we would expect to be manifested, in theory, by a population experiencing the vital rates or other conditions expressed in the values assigned to the model's basic parameters.

The models developed in the previous chapter cannot be regarded as purely descriptive, nor can they be viewed as analytic, devoid of empirical content. The descriptive quality of these models is limited by the fact that it is impossible to ascertain with certainty that the values assigned to the models' basic parameters have ever corresponded exactly to actual conditions prevailing among the Navaho population at any given time. Nevertheless, these constructs are not entirely analytic in nature, since the values assigned to the models' parameters were selected so as to conform as closely as possible to actual conditions prevailing among the Navaho at different periods, insofar as could be determined from the available data. It can be concluded that the essential character of such constructs is similar to that of Max Weber's "ideal types," whose basic elements are selected from empirical sources,

²⁵ The reaction of a number of European ethnic minorities to the assimilative pressures of American life suggests a different outcome in this respect. It can be argued that once an acceptable degree of acculturation has been achieved, permitting a full share of the economic and social benefits that accompany such acculturation, the interest of educated Navahos in their unique cultural heritage may be enhanced rather than attenuated. They would thus aspire, as have the educated members of many other ethnic groups, to preserve their separate identity within the correspondingly broader framework of American society and culture.

but whose structure reflects a system of theoretical inferences which may not be observed among the available data.²⁶

A word should be added in regard to the possible misinterpretations which may attend the development of such constructs by demographers who attempt to cope with data of limited quality or quantity. The conclusions reached by demographers who analyze data for a given population tend to have an immediate impact upon the policy decisions of administrators who are concerned with the population in question. It is therefore especially important that the demographic analyst should maintain a careful distinction between the data as given and the data as interpreted or adjusted. In practice, however, this distinction is difficult to preserve, especially where the data as given may reflect biases or omissions which the demographer can adjust or correct far more readily and accurately than can the ultimate user of these data. Perhaps the most efficacious policy, under these circumstances, is for the demographer to carry out whatever adjustments appear to be warranted in the data as given, while providing an explicit account of such adjustments. On the other hand, the administrator or other user of these data must be cautioned that the reliability of adjusted data and the validity of inferences derived therefrom, are no greater than the reliability and validity of the original data.

We are led, on the basis of these considerations, to the second approach, which is to undertake a direct program aimed at developing a single set of administratively useful population records, utilizing to the fullest degree the recent technological advances in the recording, processing, and recall of the data obtained. The most essential feature of such an approach would be the preparation of a schedule on which could be recorded the demographic, economic, and health data which are essential to the several administrative programs that are carried out among the Navaho.

One of the greatest difficulties with the present system of data collection among the Navaho lies with the variety of uncoordinated operations whereby each administrative service conducts its own surveys, assembles its own data, and attempts to determine its policies on the basis of the necessarily partial information so obtained. The result is a vast accumulation of records, none of which represents a fully adequate description of the population as a whole. Furthermore, periodic attempts to match these records with one another, in order to verify information, omit possible duplications, and reveal other inconsisten-

²⁶ The development of the "ideal type" concept is traced in Johnston, MS.

An excellent summary of the dangers inherent in the use of mathematical constructs is provided in Kaplan, 1960.

Additional articles on the use of models in social science have been written by Rapoport (1959) and Brodbeck (1959). Brief summaries of the use of such models in demographic analyses is given in International Union . . . , 1959; Yntema (1952); and Lopez (1961).

cies, have been frustrated by the heavy costs of such matching procedures, as well as the vagaries of Navaho nomenclature.²⁷

A detailed outline of the procedures which might be employed in this second approach does not fall within the province of the present study. One implication of this approach, however, is the desirability of establishing among the administrative services of the Navaho a single, permanent, data-collecting agency with the authority to design, coordinate, and execute all data collection programs for the Navaho. Such an agency would also be charged with the responsibility of maintaining the records so obtained and utilizing modern techniques for the recollection and duplication of stored information so as to meet the different needs of the respective agencies.²⁸

The collection of reliable information, however, cannot be accomplished merely by the establishment of a central agency or by the purchase of elaborate data-processing machinery. The critical problem with all efforts at data collection will always be that of locating the respondent, identifying him so that he will not be confused with other respondents, and obtaining from him the required information. In an area the size of the Navajo Reservation, the only feasible solution to this problem would appear to involve the establishment and maintenance of a number of field offices from which a small staff could operate in a well-defined area surrounding their particular office.²⁹ The primary task of these field teams would be to establish and maintain a population register for their local area, and to carry out the necessary field surveys as dictated by the data needs of the several administrative services.³⁰

Available techniques of area sampling offer interesting possibilities in this connection. For example, periodic surveys, conducted on an area sample basis, could be designed to incorporate a recanvas of selected areas at stated intervals. As an illustration: If a number of randomly selected areas were recanvassed at 15-month intervals, the accumulated data would provide a description of the residence and

²⁷ Anthropologists working among the Ramah Navaho, for example, uncovered several instances of individual Navahos who appeared on as many as eight separate administrative records under different names. This problem is of course familiar to all experienced workers in this area, but its impact upon the statistics cannot as yet be assessed.

²⁸ A 2-year study of the Papago Indian population has recently been completed by Drs. William H. Kelly, Robert A. Hackenberg, and other members of the staff of the Bureau of Ethnic Research, University of Arizona. Preliminary results of this study, aimed at developing appropriate techniques for the establishment of a population register for the Papago and other similar Indian populations, together with a more recent report for the Navaho population, contain a wealth of useful suggestions. See Kelly and Hackenberg, 1957, and Kelly, 1964.

²⁹ It is unrealistic to perpetuate the convenient fiction that a Navaho is going to undertake a round trip of 100, 200, or 300 miles merely to inform a clerk at Window Rock that he has decided to build himself a new hogan somewhere else.

³⁰ The use of a single, standardized schedule and of modern machinery for the duplication of records would permit the accomplishment of both of these objectives in the same operation.

migration patterns for these areas at different seasons of the year at quinquennial intervals, together with two observations at the same season at 5-year intervals, thus affording a measure of population trends in the interim.³¹

It must be stressed that the general problem of developing and maintaining an improved system for the collection of demographic data among the Navaho is increasingly related to the corresponding problem in regard to American Indians as a whole. In view of the growing dispersion of the Indian population among that of the general society, it can be argued that the efforts of a single Indian agency or administration, however well conceived and directed, can no longer be expected to produce adequate demographic statistics relating to the population under its jurisdiction, without extending its research activities far beyond the confines of its local area. It appears, therefore, that the collection of improved demographic statistics on the Indian population of this country would require a coordinated effort, nationwide in scope.

A summary of the several major interests which would be served by the collection of improved demographic statistics on this population points clearly to the need for an integrated approach in obtaining and processing the basic data.

In the first place, the greater dispersion of the Indian population in off-reservation areas makes it increasingly difficult for local Indian agency officials to maintain accurate rolls of the Indians under their respective jurisdictions.³²

Secondly, the registration of vital events occurring among Indians requires some coordination and regulation of the activities of the officials who carry out this registration at the State and county levels. Here, also, the growing dispersion of the Indian population makes it imperative that these officials, especially in the "non-Indian" States, be informed of the need to properly identify Indians as such, and to record their tribal affiliation on the appropriate certificates. It need hardly be added that the processing of these vital statistics, aimed at determining vital rates and trends among the several Indian tribes, could be carried out most effectively at a central office, linked administratively to the National Vital Statistics Division of the U.S. Department of Health, Education, and Welfare. In this connection,

³¹ The question of costs cannot be dealt with in this brief outline, except to remark that such a program as is envisaged here would require heavy initial expenditures together with continuing financial support thereafter. It might be added, of course, that the "cost" of continued uncertainty with regard to the size of the Navaho and other Indian tribes is itself considerable.

³² Results of the 1960 census indicate that the intercensal increase in the Indian population of "non-Indian" States is two to three times as great, on the average, as the corresponding increase in the "Indian" States. A substantial part of this difference can probably be attributed to the growing dispersion of the Indian population, although the improved recognition of Indians in "non-Indian" States through self-enumeration may also have played an important part in this growing disparity.

it has been suggested that the registration of Indian births could be greatly improved by the establishment of an administrative procedure whereby a document certifying enrollment with a specified Indian tribe could be issued upon receipt of a properly filled birth certificate for a qualified individual.³³

A third source of demand for improved statistics on Indian population is the Indian Claims Commission, whose legal decisions have frequently necessitated the disbursement of funds among the members of a specified Indian tribe. Such disbursement involves the preparation of a special disbursement roll on which are recorded the names of all persons who are legally entitled to a share of the disbursement. In most instances, therefore, the preparation of such a roll amounts, in theory, to a listing of the entire *de jure* population of the specified tribe.³⁴

A word should be added, finally, on the role which might be played by the Bureau of the Census in regard to the planning and initiation of special surveys on selected Indian reservations and in regard to its regular decennial enumerations of the nation as a whole. The Bureau would be admirably suited to the task of developing appropriate area samples in selected reservation areas, training survey personnel, and providing technical assistance in every phase of the survey operations. Furthermore, the utilization of the facilities of the Bureau for the preparation of basic schedules and the processing of the data obtained thereon would facilitate the development of a standardized schedule and processing procedure, approved by the Bureau of the Budget, which could then be utilized in all Indian agency areas.

In its decennial enumerations, the Bureau of the Census will continue to provide an authoritative and independent body of information on the size and characteristics of the Indian population, as long as American Indians are separately identified as such on the census schedules. However, the usefulness of these data is seriously limited by the failure to indicate the tribal affiliation of the Indians that are enumerated. In the absence of such identification, only those Indians who remain in residence on or near the major reservations can be identified in terms of tribal affiliation. In view of the rapid growth

³³ The general problem of the registration of vital events among American Indians is excellently summarized in Hadley, 1950. The broader question of Indian population statistics is similarly treated in De Lien and Hadley, 1952.

³⁴ Representatives of the Navaho tribe filed a petition before this Commission on Aug. 8, 1951 (Docket No. 229). A long series of hearings have been held on the petition, and the outcome of these hearings is still pending. A finding in favor of the tribe, involving a substantial financial award, might lead to a decision on the part of the members of the tribe to distribute all or part of the award in the form of dividends to the tribal members. In such an eventuality, the tribal authorities would face the necessity of preparing a disbursement roll. The equity of the disbursement would obviously depend in large part upon the development of accurate statistics on the number and characteristics of the Navaho population. A brief description of the Navaho claim is provided in *Newsweek*, vol. LVII, No. 18, May 1, 1961, p. 43.

and dispersion of the Indian population of the nation, as indicated in the returns of the 1960 census, it is to be hoped that the Bureau can be induced, in the future, to obtain information on the tribal affiliation of American Indians. It would then be possible to utilize these data as an important check on the accuracy and completeness of existing Indian population registers; and as an indication of the numbers, location, and characteristics of the Indians who are leaving the confines of their original reservations for life in the mainstream of American society. These data would also provide a wealth of information for comparative studies of the process of acculturation.

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APPENDIX. METHODOLOGY

The following procedural notes describe the major technical measures that were utilized in the analysis of the demographic data on pp. 139-180, and summarize the procedure whereby samples were selected from a number of Navaho rolls.

SAMPLE SELECTION PROCEDURE

The Navaho rolls from which sample data were obtained consist of ledgers in which are listed the names, sex, ages, household relationships, location, and other information for each person on the roll. The pertinent information for each enrolled person is listed on a single line of the ledger; one ledger page typically contains 20 or 30 lines with data for the same number of persons.

In order to obtain an assured random sample of approximately 10 percent, I selected every 10th page of each ledger, starting from a randomly selected number between 1 and 10. The age and sex of each individual appearing on each sample page were recorded, starting with the head of the first family on that page. I.e., the age and sex of each member of a household whose head appeared on the sample page were recorded. According to this procedure, household members appearing on a sample page whose head was listed on a preceding page were not recorded in the sample. Conversely, household members appearing on the succeeding page were recorded in the sample if the head of the household was listed on the sample page.

The main advantage of this procedure over the more refined alternatives was its convenience in permitting an efficient clerical manipulation of the ledgers. The purpose of these samples was to provide representative age-sex distributions; no attempt was made to derive precise estimates of the size of the total population from these samples.

FORMULAS

(1) Crude birth rate:

$$\frac{\text{Number of births in one year}}{\text{Average population in that year}} \cdot 1,000$$

(2) Crude death rate:

$$\frac{\text{Number of deaths in one year}}{\text{Average population in that year}} \cdot 1,000$$

(3) Crude rate of natural increase (in percent):

$$\frac{\text{Crude birth rate} - \text{Crude death rate}}{10}$$

(4) Average annual rate of increase:

$$\frac{P_n}{P_o} = e^{nr}$$

Where

 P_n is the population at the end of a specified interval; P_o is the population at the start of that interval; n is the length of the interval in years; e is the base of the Naperian logarithms ($e=2.71828 \dots$); and r is the average annual rate of increase.

The value of e^{nr} is obtained by dividing P_n by P_o ; the value of nr is then obtained directly from a table of ascending exponential functions. Dividing the value of nr by the length of the interval (n) gives the value of r . It should be noted that this average annual rate of increase differs from the crude rate of natural increase in two important respects. First, it represents the average increase over a specified period of years while the crude rate of natural increase pertains to a single year. Second, its value is derived from the population at the start and at the end of the specified interval, so that it incorporates the effects of migration as well as fertility and mortality during that interval. By contrast, the crude rate of natural increase reflects solely the current rates of birth and death. In the case of the Navaho population, of course, the effect of migration is negligible until fairly recently.

$$(5) \text{ The range of chance variation: } \sigma_p = \sqrt{\frac{(p \ q)}{N}}$$

where

 p is the observed rate of occurrence of a specified event (such as a birth or death rate) in a specified population, expressed as a decimal fraction; q is equal to $1 - p$; N is the size of the specified population; and σ_p is the range of chance variation (one standard deviation) from the observed rate.

This measure provides a convenient (but very approximate) indication of the amount of chance variation that may be associated with a specified rate in a population of specified finite size. Approximately 65 percent of the values obtained from a long series of independent observations of similar populations would fall within the range expressed by the observed rate, $\pm \sigma_p$. Correspondingly, approximately

95 percent of such values would fall within the range expressed by the observed rate, $\pm 2\sigma_p$. The latter range was utilized in connection with the age-specific death rates shown in table 35.

MEASURES OF AGE DISTRIBUTIONS

The calculation of the sex ratio score, the male and female age ratio scores, the joint score, and the adjusted joint score, are illustrated in appendix table 1. Given the distribution of a population, by age and sex, the above measures can be calculated in the following steps:

APPENDIX TABLE 1.—*Illustration of procedure for calculating age and sex ratio scores and joint score for a given age distribution*¹

Age groups (in years)	Navaho population, 1910 census					
	Male	Female	Sex ratio	Difference between sex ratios	Male age ratio	Female age ratio
All ages.....	11,305	11,072				
Under 5.....	2,000	1,916	104.4			
5-9.....	1,916	1,823	105.1	0.7	91.6	91.8
10-14.....	1,512	1,430	105.7	0.6	104.8	107.2
15-19.....	1,255	1,244	100.9	4.8	94.2	94.3
20-24.....	854	916	93.2	7.7	117.9	110.9
25-29.....	759	788	96.3	3.1	92.8	98.8
30-34.....	554	642	86.3	10.0	127.2	109.4
35-39.....	651	617	105.5	19.2	78.4	88.7
40-44.....	467	453	103.1	2.4	102.4	94.9
45-49.....	305	243	125.5	22.4	116.7	137.0
50-54.....	245	213	115.0	10.5	99.8	96.2
55-59.....	184	167	110.2	4.8	111.7	109.9
60-64.....	166	154	107.8	2.4	103.9	103.2
65-69.....	161	151	106.6	1.2	86.0	92.0
70-74.....	111	124				
75 and over.....	165	191				
Total.....				89.8		
Sum of deviations from 100.....					141.8	120.9

$$^1 \text{ Sex ratio score: } \frac{89.8}{13} = 6.9$$

$$\text{Male age ratio score: } \frac{141.8}{13} = 10.9$$

$$\text{Female age ratio score: } \frac{120.9}{13} = 9.3$$

$$\text{Adjustment for small size of population: } \frac{3500}{\sqrt{p}} = \frac{3500}{\sqrt{22377}} = \frac{3500}{149.6} = 23.4$$

$$\text{Joint score: } (6.9 \times 3) + 10.9 + 9.3 = 40.9$$

$$\text{Adjusted joint score: } 40.9 - 23.4 = 17.5$$

Step 1. The sex ratio (number of males per 100 females) is calculated for each of the given age groups.

Step 2. The difference between each successive pair of sex ratios is obtained, up to age group 70-74.

Step 3. The ratio of each successive age group (for each sex separately) to the average of the preceding and succeeding age group is obtained.¹

¹ In calculating the age ratios shown in table 28, the above ratio was reversed. Accordingly, the male and female age ratios shown in appendix table 1 are obtained by dividing the average of each set of preceding and succeeding age groups by the intervening age group. Either procedure produces the same result. It should be noted, further, that results of sufficient accuracy can be obtained by using a percentage age distribution instead of the actual numerical frequencies. In calculating the scores given in table 28, percentage age distributions were used exclusively.

Step 4. The sum of the differences between successive sex ratios is obtained, without regard to signs.

Step 5. The sum of the deviations of the male and female age ratios from 100 is obtained, for each sex separately, again without regard to sign.

Step 6. The sex ratio score is equal to the sum obtained in *Step 4*, divided by the number of differences calculated. In appendix table 1, this score is equal to 89.8 divided by 13, or 6.9.

Step 7. Each age ratio score is equal to that sum obtained for each sex in *Step 5*, divided by the number of age ratios calculated. In appendix table 1, the male age ratio score is 141.8 divided by 13, or 10.9, while the female age ratio score is 120.9 divided by 13, or 9.3.

Step 8. The joint score is equal to the sex ratio score times 3, plus the male and female age ratio scores. In the table, this score equals 20.7 plus 10.9 plus 9.3, or 40.9.

Step 9. In order to compensate for the greater chance variation in age distributions found among smaller populations, an adjustment factor is obtained by means of the formula:

$$\frac{3,500}{\sqrt{p}}$$

In the table, the size of the population whose age distribution was utilized was 22,377. The resultant adjustment factor is therefore to 3,500 divided by the square root of 22,377, which comes to 23.4.

Step 10. The adjusted joint score is equal to the joint score minus the adjustment factor. In the illustration, the adjusted joint score equals 40.9 minus 23.4, or 17.5.²

A word should be added in regard to the alternative uses or interpretations of these measures. The primary use of these measures is to provide an indication of the extent to which the given age and sex ratios depart from a smooth progression. As was mentioned in the text accompanying table 28, such departures may either reflect poor data or actual peculiarities in the given population's age distributions. A secondary, and somewhat more hazardous use of these measures is to provide comparisons of age distributions obtained for different populations. When these measures are used only for the internal analysis of a single age distribution, the adjustment for the small size of the population is not necessary. However, this adjustment is appropriate in comparing the scores obtained for populations of different size, since a smaller population would be more likely to depart from a smooth progression by chance than a larger population.

² The derivation, uses, and limitations of these measures are more fully discussed in United Nations, 1952, pp. 59-79.

CALCULATION OF STABLE POPULATION AGE DISTRIBUTIONS FROM MODEL LIFE TABLE VALUES³

The derivation of an age distribution for a stable population from selected model life table values and an assumed rate of natural increase is illustrated in appendix table 2. The procedure can be outlined in the following steps:

APPENDIX TABLE 2.—*Illustration of procedure for deriving a stable population age distribution from given model life table values*

(Model H. $e_0=60.4$ years, $r=3.00$ percent)

Age group (in years)	Midpoint of interval (a)	(a)(r)	e^{-ar}	L_x^m	L_x^m	L_x^m (percent)
All ages.....					2470622	49.3
Under 5.....	2.5	0.07500	0.92774	463493	420724	8.4
Under 1.....	.5	.01500	.98511	93665	92270	1.8
1-4.....	3.0	.09000	.91393	359828	328850	6.6
5-9.....	7.5	.22500	.79852	440230	351532	7.0
10-14.....	12.5	.37500	.68729	436230	299816	6.0
15-19.....	17.5	.52500	.59166	431860	255471	5.1
20-24.....	22.5	.67500	.50916	425305	216548	4.3
25-29.....	27.5	.82500	.43823	417588	183000	3.6
30-34.....	32.5	.97500	.37719	409715	154540	3.1
35-39.....	37.5	1.12500	.32465	401195	130248	2.6
40-44.....	42.5	1.27500	.27943	391022	109263	2.2
45-49.....	47.5	1.42500	.24051	377658	90830	1.8
50-54.....	52.5	1.57500	.20701	359368	74393	1.5
55-59.....	57.5	1.72500	.17817	334412	59582	1.2
60-64.....	62.5	1.87500	.15335	300470	46077	.9
65-69.....	67.5	2.02500	.13199	255450	33717	.7
70-74.....	72.5	2.17500	.11361	199095	22619	.4
75-79.....	77.5	2.32500	.09778	135710	13270	
80-84.....	82.5	2.47500	.08416	75538	6357	
85 and over.....	90.0	2.70000	.06917	38093	2635	.4

¹ Assumed midpoint.

$L_0^m = 25000 + (.75)(91553) = 25000 + 68665 = 93665$

$3L_1^m = (1.9)(91553) + (2.1)(88513) = 173951 + 185877 = 359828$

$4L_0^m = 25000 + (2.65)(91553) + (2.1)(88513) = 25000 + 242615 + 185877 = 453492$

Step 1. An appropriate model life table and assumed rate of natural increase must be decided upon initially. This selection must depend, of course, upon the intended purposes of the calculation. In developing the hypothetical age distributions shown in table 36, model life table values and rates of natural increase were selected in order to represent plausible rates of fertility and mortality which might have been observed among the Navaho population at different periods in the past.

Step 2. The midpoint of each age group (a) is multiplied by the assumed rate of natural increase (r).

Step 3. The values of e^{-ar} are obtained directly from a table of descending exponential functions.

Step 4. The L_x^m values which correspond to the basic q^m values of the selected model life table are next obtained directly from the basic United Nations source.⁴

³ The development, uses, and limitations of these model life tables are described in United Nations, 1955 b. The basic L_x values utilized in the construction of the hypothetical age distributions given in the present analysis were provided in a later development of these models given in United Nations, 1956.

⁴ United Nations, 1956, table iv, pp. 78-79. The model shown in appendix table 2 is "Level 80," identified by a life expectancy at birth (for both sexes combined) of 60.4 years.

In appendix table 2, only the L_x^m values are given (i.e., the number of survivors within the specified age groups for males only). The values for females must, of course, be obtained separately.

Step 5. A set of derived survivorship values ($L_x'^m$ values) are then calculated by multiplying the L_x^m values by the corresponding e^{-ar} values. The identical procedure is followed in obtaining $L_x'^f$ values from the L_x^f values given in the same model.

Step 6. In order to facilitate comparisons among age distributions, the L_x^m and L_x^f values may be expressed as percentages of the combined total of these values, for both sexes.

Step 7. An approximation of the value of L_o and ${}_3L_1$ (for each sex separately) can then be obtained by applying the following formulas to the 1_1 and 1_5 values (expressing the number of survivors to exact age 1 and 5, respectively) for each sex, as provided in the basic United Nations source.⁵ The formulas are as follows:

$L_o = 25,000$ plus $(0.75)(1_1)$ (for each sex separately). In appendix table 2, the 1_1^m value for the specified model life table is given as 91,553.

${}_3L_1 = (1.9)(1_1)$ plus $(2.1)(1_5)$ (for each sex separately). In appendix table 2 the 1_5^m value for the specified model life table is given as 88,513.

Finally, as a check on the calculations, the approximate value of ${}_4L_o$ (for each sex separately) can be obtained by the formula:

${}_4L_o = 25,000$ plus $(2.65)(1_1)$ plus $(2.1)(1_5)$. It should be noted that the derived L_o' and ${}_3L_1'$ values are only approximate, but they do yield a percentage distribution for the population under 1 year and 1 to 4 years, for each sex, that is sufficiently accurate for most purposes.

⁵ United Nations, 1956, table III, pp. 76-77.

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